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The Green Thumb

JANUARY-FEBRUARY 1967



THE COVER MATURE AMERICAN LINDEN — DENVER

THE GREEN THUMB

VOLUME TWENTY-FOUR, NUMBER ONE

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Dr. Moras L. Shubert
Mrs. James P. Steele, Jr.
Mrs. Edmund W. Wallace
Dr. Helen Marsh Zeiner

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The Green Thumb

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HELEN M. VINCENT, *Editor*

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to the Membership Chairman, Mrs. William Stanley, 3800 East Long Road, Littleton, Colorado 80120 or call 771-3617.

Second Annual Report For The Associates Of Denver Botanic Gardens

MRS. GRAHAM MORRISON, *Retiring President*

MRS. ROBERT M. KOSANKE, *Incoming President*

ON OCTOBER 14, 1966, the Associates of Denver Botanic Gardens held their second annual meeting. Mrs. Graham Morrison, President, reviewed the year's activities and noted the shift of emphasis of volunteer effort to accommodate new and more urgent needs.

Anticipating the opening of the Edna C. and Claude K. Boettcher Memorial Conservatory, The Conservatory Guide Committee was organized in September, 1965, under the chairmanship of Dr. Robert Perry. Mr. Ernest Bibee, Superintendent of the conservatory, Dr. Perry and other Associates prepared maps and gathered information on plants to be featured in the conservatory. This material was used in training nearly 40 volunteer guides prior to the formal opening in late January, 1966. Additional material was supplied as new plantings were added, and the active guides spent many hours weekly

in individual study mastering this information. Scheduled tours for groups of more than ten persons proved extremely popular with schools, garden clubs, conventions and other groups. Beginning with guests at the opening ceremonies, the guides have conducted more than 6000 persons through the conservatory-greenhouse complex. This service was provided on a more limited basis through the summer months, but during this time the training of new guides continued under the guidance of Mrs. Herbert Franson, Mr. Frank Keppelmann and Mrs. Phil Hayward. Much of the plant list information used in the conservatory issue of *The Green Thumb* was prepared by Mrs. Hayward and other members.

Additional Associates became involved in the actual planting work, and Mr. C. Edward Ridenour still devotes much time to this. Others undertook greenhouse chores of potting, air-layer-

ing, cuttings, transplanting and cleaning. Mr. Gilbert Blount, Chairman of the Houseplant Committee for the plant sale, supervised the growing and care of many plants for this purpose.

The Gift Shop, under the direction of Mrs. Chard P. Smith, Jr., experienced many problems germane to its new location. It soon became apparent one of the more important contributions to be made by the Associates would come through the additional responsibilities now assumed by women staffing the Gift Shop. Mrs. Charles V. Petersen supervises the training of these volunteers who must attend to customers, answer the conservatory telephone, greet the public, schedule tours, handle ticket sales for the garden tours and other official Denver Botanic Gardens events, supply all manner of information and fulfill the role of receptionist-hostess.

The Gift Shop opened a special booth for garden tools and supplies in the garden area during the plant sale and also manned a special shop in the South Room of the conservatory. Here the visitor found landscape pottery, starter planters for children, handcraft items and Mother's Day gifts.

Highlight of the Associates' annual meeting came when Mrs. Morrison announced the purchase of a cash register for the shop, a greatly increased inventory and then proceeded to present a check for \$1000 to Dr. Martin for use by Denver Botanic Gardens.

Much of the financial success of this venture is directly related to the dedicated work of the Crafts and Arts Committee under Mrs. J. P. Steele, Jr., and Mrs. C. J. Christensen. These Associates meet at Botanic Gardens House on the first Thursday of each month to work on items which later appear for sale in the Gift Shop or are earmarked for the annual Christmas

Sale in late November. Many additional meetings are scheduled in members' homes for special projects. This key group has snowballed a handful of dollars invested in materials into the sizeable funds needed to stabilize the Gift Shop throughout this period of groping infancy. Each of its members must feel real pride in watching the shop evolve into a profitable concern.

More than two-thirds of the Associates' members were involved in some area of the Annual Plant Sale. Associates Mrs. Ed. Honnen and Mrs. Jess Gibson, both members of Denver Botanic Gardens Board of Trustees, served as General Co-chairmen. Numerous other chairmanships were held by Associates. The excellent publicity for this sale and many other events was prepared by Publicity Chairman, Mrs. J. V. Petersen. This material included newspaper articles, spot announcements for TV and radio and personal appearances on TV. Mrs. Petersen also helped prepare and produce the new brochure containing a brief resume of the history, purpose and facilities of Denver Botanic Gardens.

Mrs. Ted Washburne, Chairman of Garden Guides, reported her committee had provided tours for more than 900 persons throughout the year. She also supervised the more than 200 members of 15 Girl Scout Troups in an amazing late fall "clean-up-the-gardens" project.

Mrs. Robert Barr, House Grounds Maintenance Chairman, spent many hours planting, transplanting, weeding and cultivating the borders around Botanic Gardens House. Jim LaBrash began the tedious job of de-grassing the flagstone walks and terrace. Members of this committee also lent a hand with work in the rose gardens and whatever task required attention. This is one area where many more working hands

are needed to keep our gardens presentable to visitors.

Library Chairman, Miss Lucy M. Crissey, noted that recruits to the staff had been increased to eight. This allows the library hours to be extended from 10:00 a.m. to 3:00 p.m. daily, Monday through Saturday. She also reported that the Gift Shop is handling the sale of "What Tree is This?." Revenue from this is assigned for use by the library.

Mr. Frank Keppelmann, Committee Chairman, and Mrs. Herbert Franson prepared an attractive display of unusual plants from the conservatory for exhibit at the Garden and Home Show in March. This booth was staffed at all times by members of the Associates.

Christmas decorations in Botanic Gardens House were designed and placed by members of the Associates

under the direction of Mrs. Robert M. Kosanke, who also placed several floral arrangements there throughout the year.

The Board of Trustees called on the Associates for assistance on several special occasions which included the fund raising campaign for Horticulture Hall, opening ceremonies for the Edna C. and Claude K. Boettcher Memorial Conservatory, two silver benefit teas sponsored by the Denver Presidents' Council, and the art show featuring the work of Mr. Lee Adams.

1965-66 has been a year of great change and progress for both the Associates and Denver Botanic Gardens. With more than two hundred members now on its roster, the coming year should see even greater contributions of energy, time and talents by Associates to their beloved Denver Botanic Gardens.

A Salute To Our Volunteer Friends

THE EDITOR

Our reticent friends and supporters who have written about the activities of their volunteer organizations are far too modest.

The statistics are indeed imposing, but the members of Denver Botanic Gardens, the Board of Trustees and the staff have been privileged to see how much dedicated work, warmth of spirit, inventiveness, talent and down-to-earth "grubbing" have gone into their outstanding achievements.

Around the Seasons, Denver Botanic Gardens Guild and the Associates of Denver Botanic Gardens have contributed so much to our growth and development that it is inconceivable we could have reached this present stage without them.

The members of the Board of Trustees and the staff at Denver Botanic Gardens are grateful to their delightful, dedicated, ingenious (and sometimes overpowering) friends in the service organizations. We fervently hope that their magnificent efforts will become family traditions and "long may they grow"!



A Branch of Denver Botanic Gardens Family Tree

As the Denver Botanic Gardens Family Tree developed, an unusual bud appeared which became Around the Seasons Club. The family album records the date as January 19, 1961.

Through the years friendships and contacts in The Colorado Forestry and Horticulture Association and Home Garden Club of Denver had brought 20 charter members together. Many of these had served on the latter organization's board; four are honored among its past presidents.

These members supported Colorado Forestry and many were active on its various committees — library, membership, garden tours, plant sale and auction, *The Green Thumb* magazine

editorial and the herbarium. In fact, the herbarium at Botanic Gardens House is known as the Kathryn Kalmbach Herbarium, honoring a late loyal member of Colorado Forestry and charter member of Around the Seasons.

With a new Botanic Gardens headquarters developing at 9th and York Street, need for a nucleus of volunteer workers was evident. On September 8, 1960, seven enthusiasts met at Cheesman Park to plan a service organization. In these critical months, its aims

could not be stated concretely. This group had assisted at a trial garden show at the University of Denver field-house and at the first garden show at the Stockyards Arena. Would garden shows continue? The Colorado Forestry and Horticulture Association and Denver Botanic Gardens Foundation were in the midst of merging.

Primarily experienced gardeners, the planners were seeking basics of plant identification and botany. The nucleus would be a study club under the guidance of two devoted botanists, Mrs. Katharine Bruderlin Crisp (former teacher at North and East High Schools and recognized in "Rocky Mountain Naturalists") and Dr. Helen Marsh Zeiner (assistant professor at the University of Denver).

Meetings were to be held at Botanic Gardens House with supplementary field trips and workshops. Suggested field trips were visits to greenhouses, parks, nurseries, following S. R. De Boer's flower trails —. With Mr. De Boer's blessing, he became the club's godfather and we assumed the name "Around the Seasons Club," the name taken from his delightful book, "Around the Seasons in Denver Parks and Gardens." The club's insignia, designed by Mrs. J. P. Steele, Jr., is an adaptation of this theme.

And so, in January 1961, 20 persons organized with this purpose: to develop interest and understanding of horticulture through study and field trips and to cooperate with other groups whose aim is promoting civic pride and beautification. Regular meetings were to be held September through May at 10:00 a.m. with workshops or field trips following a sack lunch.

Mrs. Crisp, with Mrs. C. O. Parker as vice-president, mothered the club through its infancy. In the first month

members made 231 nut-animal favors for Denver Botanic Gardens Annual Dinner. Appropriately, plant study began with "Roots." On Arbor Day, to honor Mrs. Crisp, three 'Paul's Scarlet' hawthorns were planted at the York Street Unit of Denver Botanic Gardens. Summer field trips took us to Lookout Mountain and Apex.

The club assumed responsibility for a Denver Botanic Gardens membership booth at the garden show. Handicrafts (place mats, plaques, dish gardens) netted \$400 profit when sold at a fiesta, part of the annual plant sale and auction.

During the first full club year, under Mrs. Parker's leadership, the club again decorated the tables for the annual dinner and assisted at the garden show. A Christmas buffet, with the Gardens' staff as guests, became a tradition. At Dr. Hildreth's request, the club assumed responsibility for selling and dispensing information about comparatively unknown woody plants at the plant sale in Cherry Creek Mall. Profit from this enterprise was more than \$600.

Through the years, study programs have included lessons in series on basic botany, basic ecology, a survey of the plant kingdom and ecology of this region. Plant families studied include exotics in gardens and at the conservatory and those families predominant among native flowers, shrubs and trees. Field excursions took the club from tropics to high plains to tundra via parks, gardens, nurseries and greenhouses, from nearby hillsides to Colorado Springs, Bailey and Mt. Goliath.

Activities paralleled the Gardens' growth. Mrs. Lucian Long and Mrs. Graham Morrison led or shared responsibilities for three successive plant sales and the club continued selling special plants at the annual sale.

In 1964, responsibilities zoomed. With Mrs. Morrison again co-chairman, the club assumed responsibility for the sale of all plants other than herbs or those donated from private gardens. Greenhouses and nurseries cooperated by growing for the sale those plants especially successful in the Gardens and city parks, or plants perfectly hardy, but little known or grown here. Club members managed a special plant sale issue of *The Green Thumb* magazine. They sought publicity and help. Enthusiastic workers responded from the Colorado Federation of Garden Clubs, Inc., the Denver Botanic Gardens Guild, the Swingle Study Club, Men's Garden Clubs, independent garden clubs and unaffiliated volunteers. Netting about \$6000, the event was a sell-out and the auction was eliminated! Club activities induced more dedicated workers to seek membership in Around the Seasons and the club roster was filled.

Despite its success, the sale was grossly understaffed. Earlier, Mrs. Long suggested need for an organization of volunteers wishing to aid the Gardens but for whom membership was not available in either service organization. Mrs. Morrison, with members of the latter groups, the encouragement of Director A. C. Hildreth and the Board of Trustees, brought this idea to fruition in 1964. Associates of

Denver Botanic Gardens became part of us and we of it. Twenty members of Around the Seasons serve both groups as officers, chairmen, and workers.

Better known for its contributions of muscle than money, Around the Seasons Club retains a "supporting membership" in Denver Botanic Gardens, contributed \$200 toward purchase of a portable loud speaker for use at the Gardens and, during the Horticulture Hall fund drive, the club's donation, plus donations of its members, their families and bonus credits, totaled \$1840.

Around the Seasons Club appreciates reviewing pages from its family album and takes pride in service for Denver Botanic Gardens. After six years this study group continues with members active in 42 places on 10 committees functioning for the Gardens. 15 members are involved in buying, selling or producing arts and crafts items for the Gift Shop. Mrs. Crisp heads the editorial committee and Dr. Zeiner, the herbarium committee. In addition, members assist the plant sale project by managing or assisting at the booths for annuals, perennials, rock plants, unusual woody plants, geraniums and hanging basket materials, and house plants. Every member participates in this effort.

— B. E. P.

Reservations for guided tours of the Conservatory at Denver Botanic Gardens may be made by calling the Conservatory number, 297-2348, between 9:00 a.m. and 4:00 p.m. daily.

The Children's Garden

1966 Activities

MARILYN A. HOLMES

THE CHILDREN'S GARDEN project, which was begun at Denver Botanic Gardens under the direction of Dr. A. C. Hildreth, completed its seventh successful year with graduation exercises on September 10, 1966. There were 110 plots, each containing approximately 150 square feet. The purpose of the Children's Garden is to interest youngsters aged 9 to 14 in plant life and encourage them to grow different kinds of garden plants.

The graduation ceremony was complete with ribbons, awards and prizes. Certificates for the successful completion of the course were given to 108 children.

In conjunction with the graduation, a Fair was held to display products the children had grown in their individual plots. Each gardener was allowed three vegetable and two flower entries — to be chosen from a list of 30 garden plants. Plots were judged on layout, number of varieties of vegetables and flowers and general upkeep and appearance.

Judges for the Fair included Mrs. Claude Burt, Mrs. Russell Qualls and Mrs. W. G. Gressett. They awarded first, second and third prize ribbons for the best entries of each product in the advanced and beginners' groups.

Plants, seeds, bulbs, tools and water were provided by Denver Botanic Gardens, and the children were allowed to choose any plants except vines.

Before planting their gardens, the children were instructed in gardening, and through the season they were advised and helped by Brian Kimmel, summer staff member at Denver Botanic Gardens, plus six advanced young gardeners. Mrs. James Layden and Dr. John R. Durrance were co-chairmen of the Children's Garden Committee and Dr. Joseph W. Hovorka was the Garden Supervisor.

In the advanced group, Debra Yeager was the first-place winner, Donna Stanley placed second and Danny Schopp third. Honorable mention awards went to: Susan Smiley, Debby and Ricky Vittetoe, Randy Cordova, Mike Edwards, Joyce Murray, Jeanie Marranzino and Joan Mosley.

In the beginners' group, Mia Kawakami placed first, David Dow placed second and Kathleen Carroll was third place winner. Honorable mention awards were given to: Susan Watson, Mary Murray, Mary Kay Kenney, Doreen G. Yamamoto, Pamela and Miki Ando, Mary Pat Knudson and Bobby Bush.



First Place Award, Beginner's Group — MIA KAWAKOMI

CHART SHOWING USE AND CHARACTERISTICS OF S

Name of Tree	Height	Habit	Transplant	Subject to Sunscale	Density of Shade	Structure in Regards Break
SILVER (SOFT) MAPLE (<i>Acer saccharinum</i>)	50-70'	spreading round	readily	yes	heavy	weak
NORWAY MAPLE (<i>Acer platanoides</i>)	40-60'	compact round	difficult	yes	heavy	fairly sturdy
SCHWEDLER MAPLE (<i>Acer plat. var. schwedleri</i>)	Same characteristics as above.					
OHIO BUCKEYE (<i>Aesculus glabra</i>)	30-40'	round	difficult	no	heavy	weak
HORSE CHESTNUT (<i>Aesculus hippocastanum</i>)	40-50'	compact round	difficult	no	heavy	fairly sturdy
TREE OF HEAVEN (<i>Ailanthus altissima</i>)	30-40'	open round	readily	no	light	weak
EUROPEAN WEEPING BIRCH (<i>Betula pendula tristis</i>)	30-40'	weeping pyramidal	readily if timed right	no	light	weak
CATALPA (<i>Catalpa speciosa</i>)	40-60'	open pyramidal	readily	yes	medium	sturdy
HACKBERRY (<i>Celtis occidentalis</i>)	50-60'	spreading round	difficult	no	medium	sturdy
DOWNY HAWTHORN (<i>Crataegus mollis</i>)	20-30'	compact oval	difficult	no	heavy	sturdy
WASHINGTON HAWTHORN (<i>Crataegus phaenopyrum</i>)	20-30'	compact	difficult	yes	heavy	sturdy
RUSSIAN OLIVE (<i>Elaeagnus angustifolia</i>)	20-30'	open spreading	readily	no	light	sturdy
GREEN ASH (<i>Fraxinus pensylvanica</i>)	40-60'	compact round	readily	yes	heavy	fairly sturdy
HONEY LOCUST (<i>Gleditsia triacanthos</i>)	40-60'	open round	readily	yes	light	sturdy
THORNLESS HONEY LOCUST (<i>G. Triacanthos var. inermis</i>)	Popular varieties include: Shademaster, Imperial, Morrair Same characteristics as above, except it is both seedless a					
KENTUCKY COFFEE-TREE (<i>Gymnocladus dioicus</i>)	40-50'	open	difficult	no	light	sturdy
BLACK WALNUT (<i>Juglans nigra</i>)	40-50'	rounded to upright	difficult	yes	light	weak
GOLDEN RAIN TREE (<i>Koelreuteria paniculata</i>)	15-25'	rounded to vase	readily	yes	light	weak
FLOWERING CRABS (<i>Malus sp.</i>)	15-30'	varied	readily	yes	light	fairly sturdy
COTTONWOOD (<i>Poplus sargentii</i>)	50-80'	open spreading	readily	no	medium	weak
RED OAK (<i>Quercus rubra "borealis"</i>)	40-60'	spreading round	readily to difficult	yes	medium	sturdy
BURR OAK (<i>Quercus macrocarpa</i>)	40-70'	pyramidal	difficult	yes	medium	sturdy
WEeping WILLOW (<i>Salix babylonica</i>)	50-70'	round weeping	readily	no	heavy	weak
MOUNTAIN ASH (<i>Sorbus aucuparia</i>)	20-30'	open spreading	readily	yes	light	weak
AMERICAN LINDEN (<i>Tilia americana</i>)	40-60'	upright spreading	readily	yes	heavy	fairly sturdy
LITTLE-LEAF LINDEN (<i>Tilia cordata</i>)	30-50'	compact pyramidal	readily	yes	heavy	sturdy
AMERICAN ELM (<i>Ulmus americana</i>)	50-70'	spreading vase	readily	no	light	sturdy
CHINESE ELM (<i>Ulmus pumila</i>)	40-60'	compact round	readily	no	medium	very weak

THE MOST POPULAR TREES PLANTED IN COLORADO

th ince	Disease Resistance	Insect Pests	Roots	Flowers	Fall Color	Comments
or	fair	few	shallow	inconspicuous	yellow	Not too desirable for small home sites. Subject to serious heart rot.
or	good	few	deep	inconspicuous	orange yellow	Desirable tree. Should be used more.
						Desirable because of its red leaf color during spring.
or	fair	few	deep	greenish-yellow clusters	orange	Hardy, but only few used here.
or	fair	few	very deep	showy white in long spikes	none yellow	Hardy, but only few used here.
od	good	none	deep	small yellow in clusters	none	Adaptable to very adverse growing conditions. Often considered a weed tree.
or	fair	few	shallow	inconspicuous	yellow	Beautiful specimen tree even during winter season.
ir	good	few	deep	showy white in upright panicles	none	Very beautiful in bloom, however drops faded blooms and cigar-like pods.
ry od	good	few	deep	inconspicuous	yellow	Once established will withstand very adverse conditions.
ir	good	few	deep	showy white	red fruits	Small attractive tree, good for year round ornamental use.
ir	good	few	deep	showy white	scarlet	Small persistent red fruit gives nice winter effect.
od	good	few	shallow	small but fragrant	silver	Good tree for foliage contrast.
ir	good	few	deep	inconspicuous	yellow	Somewhat messy because of its prolific seeding habit. Seedless varieties now available.
ry od	good	few	deep	inconspicuous	golden	Grows well under most soil conditions. Good lawn tree.
ine. ss.						Relatively new in this area. Has good possibilities.
ir	good	few	deep	inconspicuous	none	Grotesque form of growth gives interesting winter character.
or	good	few	very deep	inconspicuous	none	Not considered a specimen type tree.
or	good	few	deep	small yellow in upright spikes	none	Very picturesque small tree, but hard to establish. Sometimes shrubby.
or	good	few	shallow	very showy, white to red	none	Many varieties available. Very good for ornamental use.
od	fair	few	shallow	inconspicuous	yellow	Massive tree at maturity. Should not be considered for small home sites.
air	fair	few	deep	inconspicuous	scarlet	The best oak for this area.
od	fair	few	deep	inconspicuous	none	Tolerates alkaline soils. Should be used more.
or	poor	many	shallow	inconspicuous	yellow	Large tree, requires more space than found in average home site.
or	poor	few	shallow	showy white clusters	reddish	Showy flowers and persistent fruit, good for ornamental use.
or	good	few	deep	small but fragrant	yellow	Good shape. A clean tree.
or	good	few	deep	small but fragrant	yellow	Excellent small tree, has good possibilities.
od	fair	many	deep	inconspicuous	yellow	Despite its many drawbacks, still a reliable tree.
air	fair	few	shallow	inconspicuous	yellow	Very rank and weak growth under irrigation. Not a good city tree.

Report on Library Activities For 1965-1966

LUCY M. CRISSEY

Chairman, Library Committee

THREE ITEMS are worthy of reporting about the Helen K. Fowler Library for the year that is just closing. They relate to staff, finances, and the book collection.

Recruits to the volunteer staff raised the total of active members to eight. This makes it possible, barring the unforeseen, to man the library six days a week (excluding Sunday) from 10 a.m. to 3 p.m.

When the Board of Trustees was unable to provide a budget for current library expenses, Mrs. Alexander Barbour once again came to the rescue, generously contributing a substantial sum to be used exclusively for library purposes. She also assigned to the library the total revenue from the sale of the booklet, "What Tree is This?," a second printing of which she had financed.

By permission of the Executive Committee, a large number of duplicate books and periodicals was sold at the Annual Plant Sale, netting \$140. At the same time a recent encyclopedia on



orchids was acquired in exchange for a series of duplicate issues of *Horticulture*.

The adequacy of the book collection was tested, in part, during the winter when guides were being trained for the conservatory tours. The number and quality of books and pamphlets on tropical plants were found to be unexpectedly good. The collection in general continued to be augmented by gifts and purchases, making possible a certain amount of withdrawal of duplicates and older books to basement storage. If these books prove to be as little needed as now seems probable, they may form the nucleus of an exchange collection to be offered to other botanic libraries.

Mysteries of Timberline

M. WALTER PESMAN

DO YOU KNOW what timberline is? I don't mean a sober definition: "the height on mountains at which the growth of trees stops." Let us therefore say: "Have you experienced timberline?"



PIPSISSIWA

Timberline is a kind of unreal, mythical abode — fantastic, weird, spectral. It is the region where fairies, gnomes and pixies would have a dwelling place. The tortured trees, themselves, appear like human victims over which an evil sorcerer has cast a spell. Perhaps some time at midnight, by full moon, the magic may be lifted and, for a brief period, their spirits will be free to mingle with the host of mythical beings of past and present fantasy.

The spell seems to hold some trees crouching, while others point their gaunt fingers and hide their evil eyes among their arms. Then we find, hidden in protected spots, such choice ethereal flowers as the shy woodnymph, half afraid to look up, the fairy slipper orchid and, later, the dainty pipsissiwa.

Timberline in the Rockies is high: it ranges from 10,000 feet above sea level in the Yellowstone National Park to 12,500 feet in New Mexico. Even at the same latitude it varies considerably, depending upon wind, exposure



WOODNYMPH

and moisture. It creeps up in protected valleys, it dissolves into scattered tree groups where freakish winds sweep an exposed west slope, for the high winds come from the west, charging up the mountain side.

Is it due to this eerie feeling of timberline that the very wind seems to howl in a specific timberline wail? I



Wind-beaten, distorted, grotesque, pitiable "wind timber," on James Peak.

"sensed" timberline when crossing the divide between Norway and Lapland, even if it was only 514 meters "Hojd over Havet" (above sea level). Perhaps it is the dense quality of the timberline foliage which produces a different note?

Although always picturesque in form, timberline trees are of few types. Limber pine, *Pinus flexilis*, is the most spectacular kind and it is easily recognized by its weird "timberline look." Bristlecone pine, *P. aristata*, at best a scrubby, often malformed tree, changes into a prostrate shrub at timberline. It is much less common in Colorado than the limber pine; the Rocky Mountain National Park does not have any, and Pikes Peak has only a few small groves, but in the San Juan Forest in southwestern Colorado there are enough to make cutting profitable.

How does one recognize this bristlecone pine, also called foxtail pine? Botanists are sure to point out the curved prickles on each scale of the

cone, and the bundle of five needles (the latter characteristic holds for limber pine as well). The matter-of-fact nature lover has a much simpler method of identification, especially if he has been "caught" while being initiated by a more seasoned nature lover — one with a mean streak or a sharp sense of humor. Needles of the bristlecone look, for all the world, as if badly infested with pine scale, those whitish specks of scale insects. In reality, the specks are bits of rosin, quite harmless, and almost always present in great quantities on bristlecone.

We have been talking specifically about timberline trees which are of different types. Pines account for the weird, grotesque shapes on windy points. Another sort of growth is just as typical of timberline and quite different from that of the pines. Spruces and firs form natural "sheds." These sheds are made out of dwarfed individual shrub-trees, growing close together, intertwining perhaps, forming such a

close "roof" that you can walk over it on top without going through. Or you can walk or crouch under it and be protected from the wind. It is as if nature had constructed a live snowshed or windbreak of Engelmann spruce or subalpine fir, *Pices engelmanni* or *Abies lasiocarpa*.

At these high altitudes, the general wind direction is from the west and these winds are not zephyrs. Because of their force, although buds are formed on all sides of the trees, only those protected from the wind's velocity have a chance to develop. Twigs that do form are twisted around to the east, no matter where they originate. Growth protected by these "buffer" branches has a chance to reach for the light and thus extend just a little higher and to the east. As the process continues year after year (or perhaps century after century), a dense, sloping roof is built up from west to east. It may reach as high as 20 feet on the east side but come down to a foot or two on the windy west side. North and south these may stretch out for long distances — regular windrows.

Camping at high altitudes is made easier by these snowsheds. They are practically windproof and waterproof. Personally, I have lost all desire to spend a night under their protecting roof because of a porcupine encounter under such a welcoming shelter. This happened at midnight. I had tried to bed down in my sleeping bag on the porch of a deserted cabin but with little success because of the increasing ferocity of the wind. Having previously espied one of nature's outdoor bunkhouses, I decided to move my quarters and started out, drowsily, clutching sleeping bag and flashlight. Just as I found the ideal spot, the meeting with Mr. Porcupine took place. He sauntered in leisurely, his curiosity perhaps

aroused by my flashlight or, perhaps, I had disturbed his own night's rest. Our meeting seemed to produce the same psychological reaction in both of us. Without a sound and without any superfluous, sudden motions from either party, we turned in our tracks and returned from whence we had come. Of one thing I am sure; there was no shooting of quills by the porcupine. For myself, in the future, I prefer to allow others to prove the veracity of the stories concerning Mr. P.'s shooting skill.

These selfsame timberline windbreaks are also a mighty pleasant protection in daytime. Coming from a bleak mountain top above timberline, chilled and short of wind due to an overabundance of wind all around — there is chance for a warm, snug relaxation period in one of these protected



Young Bristlecone Pine

openings among the maze of flattened greenery. High altitude sun is powerful and warm; there is a feeling of being hugged and mothered by its heat and protection. That, by the way, accounts for these amazing ski-resort pictures, showing abbreviated costumes despite the snow covered slopes. Any experienced mountaineer is familiar with this uncanny combination of warm sunshine and rather low temperature of the air itself.

Is timberline fixed and stable? Even though our climate should remain unchanged, there are some indications that timberline may be moving up as far as spruces and firs are concerned. Pines, on the other hand, seem to have reached as high up as they will ever grow, according to the late Professor Francis Ramaley of the University of Colorado. In his book, *Colorado Plant Life*, he bases his premises on the following observations. Remains of limber pines, dead centuries ago, are found at present timberline; in some cases they seem to have been growing even higher

up than the present live trees. If this is the case, timberline for the limber pine is stable — may even have receded a bit.

Not so for spruce and firs. Here the newer growth has outstripped the older; the extreme limit of tree growth evidently has not yet been reached and timberline is edging up, little by little. What is the secret? Why should timberline be fixed for pines but moving up for spruces and firs? Professor Ramaley felt that it has to do with their moisture requirements because spruces and firs are trees fitted to moister situations than pines. They occupy protected valleys, glacial cirques — places, in fact, occupied by glaciers during the last ice-age. Ah! There we have it!

The last ice-period was recent — as geological periods go, occurring a mere few thousand years ago. Spruces and firs are climbing up as the ice has receded in a slow, toilsome struggle. Give them another thousand years, or two or three or four (what is time to a geologist?), and they may reach *their* top limit, just as pines have already reached theirs, not being hampered by glaciers.

In the meantime, other life goes on, filling every nook and cranny as opportunity presents itself. Even at timberline both animal life and plant life are teeming. June and July are vibrant with the morning song of white-crowned sparrows and ruby-crowned kinglets. Both breed clear up to timberline. Thrushes and warblers may join the chorus. Townsend's solitaire, for instance, has a song that fills birdlovers and poets with ecstasy. Alpine three-toed woodpeckers and Lincoln sparrows are also commonly found at this high altitude. Ptarmigans, rosy finch and American pipits were also mentioned as inhabitants of the alpine heights.



Engelmann Spruce

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Check One

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PLANT OF

THE MONTH...

Boettcher Conservatory

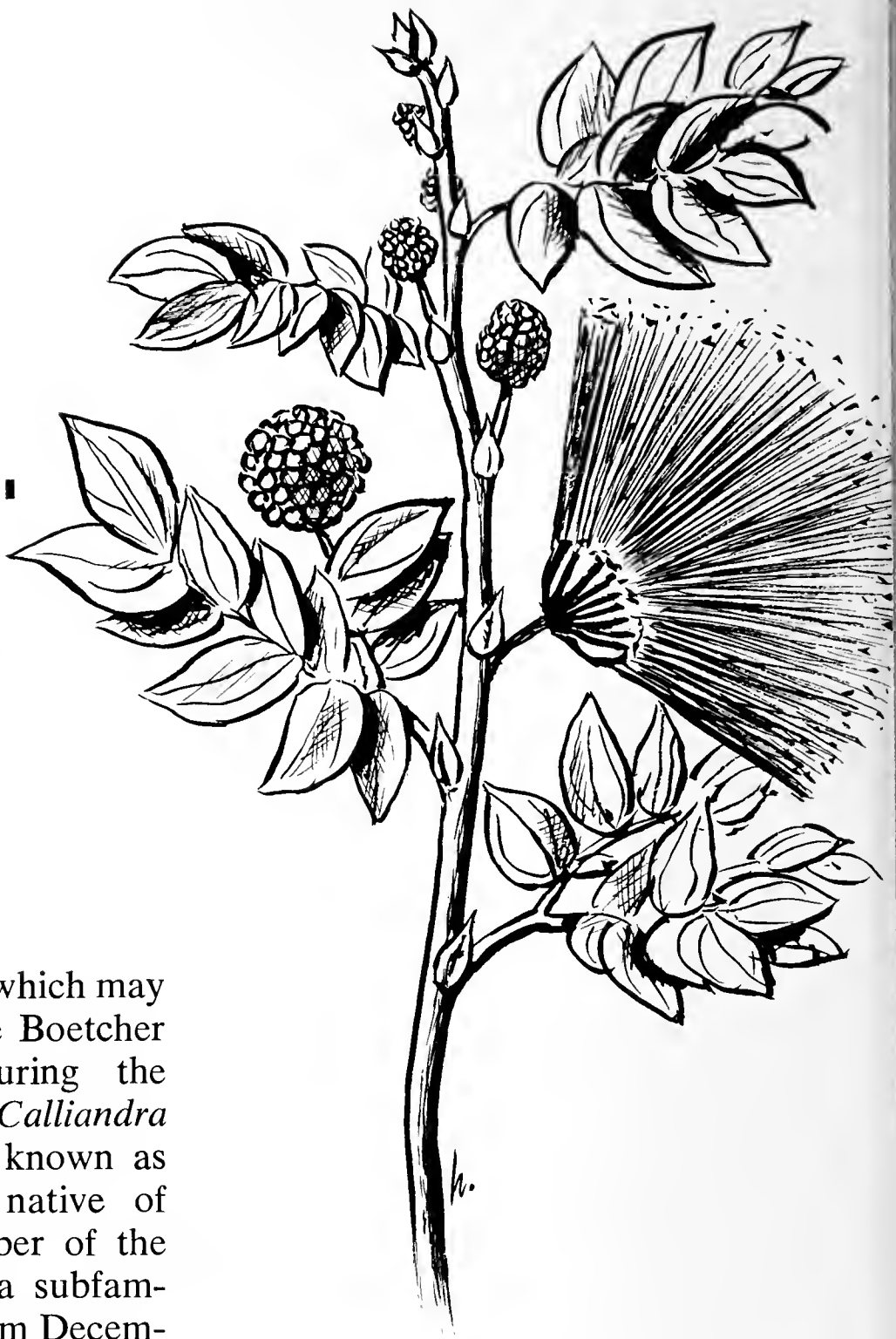
PEG HAYWARD

A SPECTACULAR small tree which may be seen in bloom at the Boettcher Memorial Conservatory during the next few months is the *Calliandra haematocephala*, commonly known as Redhead Powder Puff, a native of South America and a member of the Leguminosae family, mimosa subfamily. The blooming time is from December to April with sporadic flowering the rest of the year.

The handsome, dark evergreen, fern-like foliage consists of leaves divided into pairs, each of which is further compounded into small leaflets. These leaflets are graduated in size, the ones at the tip being largest, and each has two lateral mid-veins.

Calliandra is a combination of the Greek word for beauty with the word for stamen; it refers to the numerous lovely red stamens of the fluffy, pom-pom-like blossom. The massed crimson stamens of this nodding, four-inch, round head obscure the rest of the flower. The fruit of the plant is a flattened and sometimes curled pod.

Two other *Calliandra*s may also be



seen in the conservatory. *C. surinamensis*, a native of Guiana, is a small tree with a few short, slender branches. It is showy with numerous erect puff-like flowers which have silky white stamens tipped with pink. *C. emarginata*, common name Dwarf Red Powder Puff, from Mexico, is a clambering, small shrub with smooth bipinnate leaves which have a notch at the apex and inflorescence with bright red stamens.

Many of the tropical and sub-tropical plants have beautiful and exotic blooms. The Redhead Powder Puff is no exception and will probably be one of your favorites in the conservatory with its display of fluorescent blooms during the next few months.

Take Care Of Your Storm Damaged Trees

KEN WILMORE

— *Green Bowers Nursery*

EVIDENCE of one of the most destructive snow storms in our recollection can still be seen throughout much of Colorado's eastern slope.

Most of the broken limbs and branches have been hauled away, but there is much work remaining to put many of these trees back in a healthy condition.

Just a word of warning against the amateur trying to do his own work on large trees. The money you spend engaging a qualified arborist for this type of work is a bargain considering the danger of broken bones or worse in trying to do it yourself.

There are several steps listed below that I think are necessary in caring for these storm-damaged trees.

- A. Remove broken branches and limbs. They are not only unsightly but hazardous.
- B. Cut large limbs back to the trunk, when necessary, taking care not to leave a stump. (See illustration No. 1.)
- C. Trim broken branches back to a healthy terminal branch. (See illustration No. 2.)
- D. Treat large cuts with a good tree-healing preparation. (Available at better garden shops.)
- E. If cabling is required, call a qualified tree surgeon.
- F. Co-operate with municipal crews for clean-up work.

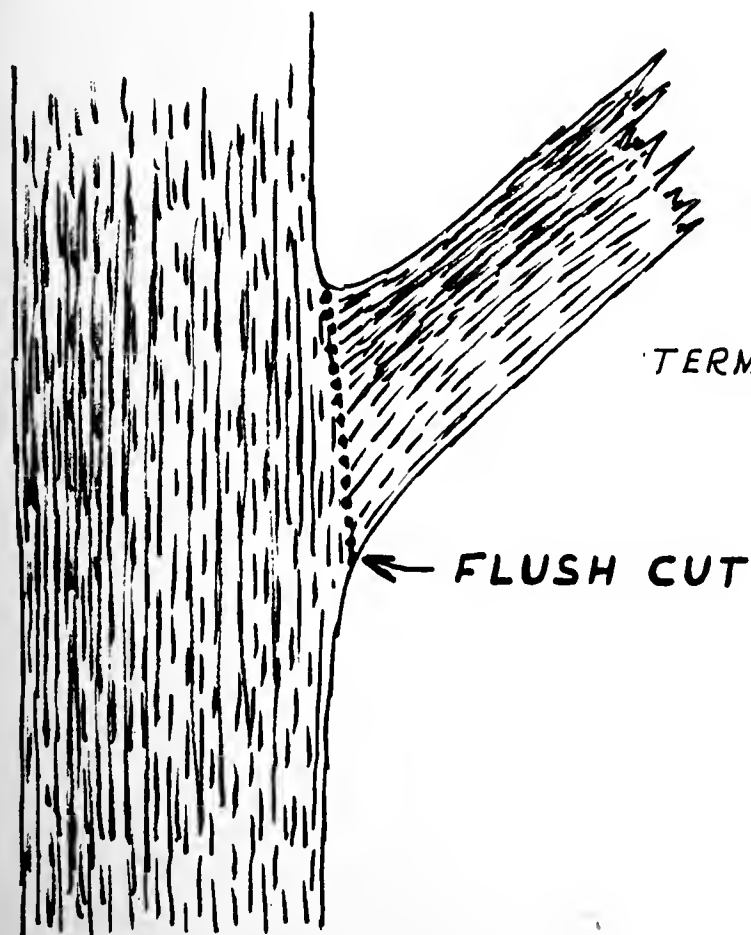


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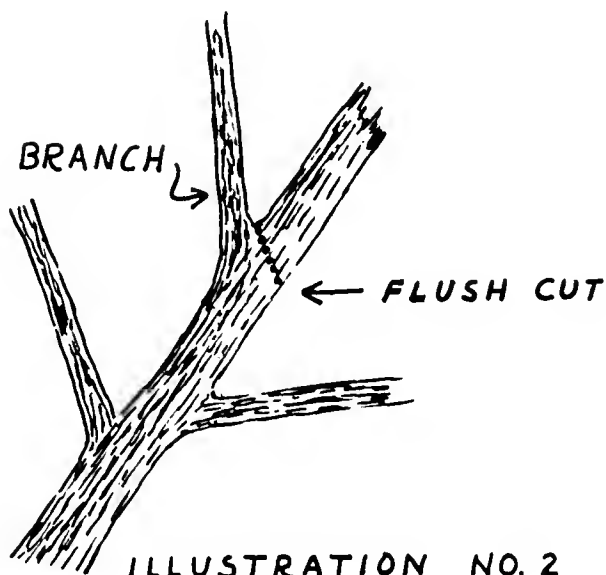


ILLUSTRATION NO. 2

EXOTICS...

Still The Talk Of The Town!

Editor

The Green Thumb

Denver Botanic Gardens

909 York Street

Denver, Colorado

I want to add a footnote to the discussion on the redbud tree (Dr. Helen Marsh Zeiner, March-April, 1966, and Roy E. Woodman, September-October, 1966).

There are three large redbud trees in my yard at 2556 Eudora Street. One of them measures 15 inches in diameter (breast high) and the other two are slightly smaller. All are about 25 feet tall; all are sturdy and healthy. They have never received any special care and have never suffered much from storms or frost. They appear to be perfectly hardy.

Their beautiful blossoms appear about three years out of five, are destroyed by late frosts on the other two. The seed pods fall all over the yard

and seedlings sprout throughout the garden, in flower beds and cracks in the walks. I am constantly cutting them off or pulling them up. Perversely, those that I have dug and given to friends did not live.

Two of the trees are growing in a narrow passageway between two houses. They have been regularly pruned as their limbs hang over the roof of a two-story house. The other tree is out in the open with no protection of any kind. The kids find them great for climbing as the limbs are regularly spaced and smooth and strong.

These trees were here when I bought the place in 1959, and I know nothing at all about who planted them or when.

WES WOODWARD

Editor's Note: With further reference to the copper beeches mentioned in Mr. Woodman's letter, there are three fine specimens to be seen at the following locations: St. John's Cathedral on the 13th Avenue side, on the Capitol grounds and on the northwest corner of 3rd Avenue and Lafayette Street.

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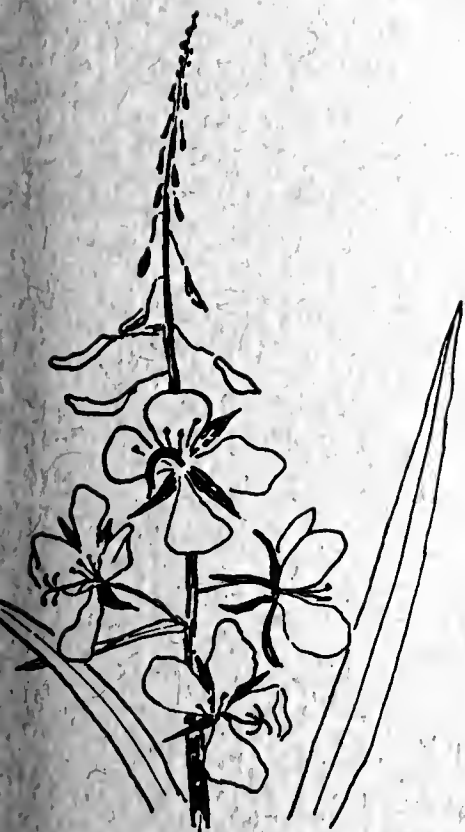
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The Green Thumb

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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

MARCH-APRIL 1967



THE COVER 'WHITE TRIUMPHATOR' TULIP

THE GREEN THUMB

VOLUME TWENTY-FOUR, NUMBER TWO

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The Green Thumb

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HELEN M. VINCENT, *Editor*

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MARCH — APRIL 1967

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to the Membership Chairman, Mrs. William Stanley, 3800 East Long Road, Littleton, Colorado 80120 or call 771-3617.

President's Annual

Report For 1966

THE FORMAL DEDICATION on January 15th of the Edna C. and Claude K. Boettcher Memorial Conservatory was the highlight for the year 1966 in Denver Botanic Gardens. Although we had no turnstiles at the opening, when the largest crowds appeared, from April 20th through December 31st we counted 163,000 visitors. Between October 1st and December 31st our Conservatory Tour Guides conducted over one hundred guided tours which included scouts, churches, schools, handicapped, and many other groups. Guides were on duty from 10:00 a.m. to 4:00 p.m. daily. These Tour Guides are volunteers who have been trained to identify some 800 tropical and subtropical plants grown in the Conservatory. At the moment we have 35 trained guides. Mrs. P. H. Hayward is chairman of the Tour Guides.

Of inestimable value to our work in Denver Botanic Gardens have been the greenhouses and laboratory rooms connected with and used in the operation of the Conservatory. Having two laboratory rooms, cold storage space for bulbs, seeds and nursery supplies plus teaching space, has been of tremendous help. For all of this we are indebted to Mrs. James J. Waring.

The May-June 1966 issue of *The Green Thumb* magazine was devoted to the Boettcher Memorial Conservatory. This issue described the buildings, plants, maintenance and numerical identification of over 200 plants.

The Gift Shop, managed by The

Associates of Denver Botanic Gardens, was moved from Botanic Gardens House at the time the Conservatory was opened to the public. Mrs. C. V. Petersen, Chairman of the Gift Shop Committee, coordinates the duties of volunteers who greet the public, answer the telephone, perform necessary secretarial detail, and sell merchandise. Through the efforts of Mrs. Hayes W. Neil the Shop has built up a regular listing of 160 book titles. The Shop has consistently shown increased sales and profits, all for the good of Denver Botanic Gardens.

One of the surprises for the use of the Conservatory building has been the South Room. Originally planned as a coffee shop or snack bar, it has been in constant use for every other purpose, including such things as displays, art exhibits, meetings, special events and Gift Shop special sales.

A fine bronze fountain sculptured by Edgar Britton was presented to us by the Assistance League of Denver. It was installed, on a temporary basis, in one of the pools in the Conservatory.

Maintenance of the various Denver Botanic Gardens units was hampered by lack of funds during the past year. The 1966 budget allotment was not sufficient for the needs of both Conservatory and grounds, and, since the Conservatory took priority over any other operation, many activities were postponed or eliminated in the Gardens. We believe that this problem has been overcome, and that in 1967 our

letters from the public will be compliments on beauty and not complaints on weeds.

Fortunately the Gates family assisted in, if not virtually maintaining the beautiful Gates Garden. We were also assisted in the maintenance of the Lew Hammer Garden by Junior Girl Scout Troop No. 552. Two hundred and thirty other Girl Scouts helped with general garden maintenance throughout the summer months.

The Children's Garden program, as always, was a popular attraction and success. It ended with the usual Fair, graduation ceremonies and the awarding of special prizes.

In the main garden, plots of tulips, iris, gladioli, day lilies, petunias, marigolds, roses, dahlias, dianthus, verbenas, annual phlox, ground covers and hardy chrysanthemums afforded a striking display of color from early spring to fall.

Guided tours of the grounds were coordinated by Mrs. T. B. Washburne, who was assisted by eight trained volunteer guides. Service groups, school units, and garden clubs were represented among the approximately 800 people who were conducted through the gardens.

The City Park Unit, consisting of about 100 acres, saw no major development during 1966. The labor force was insufficient, but the Rose Garden, Rainbow Iris Garden, DeBoer crab apple collection and lilac collection were maintained reasonably well.

The Mt. Goliath Alpine and Sub-alpine Unit plants have been partially labeled along the M. Walter Pesman Trail. Printed signs explaining the ecology and geology were installed along the trail. The signs were illustrated with line drawings prepared by Mrs. Walter B. Ash.

A 15-acre site on Bear Creek Can-

yon, ten miles west of Evergreen was willed to Denver Botanic Gardens by Mrs. Ruth Wallace Reed. We expect to have the title to the property early in 1967. This site will be an ideal place for ecological research, especially in conjunction with requested grants, study area, and additional testing site.

The Herb Garden, a gift from Denver Botanic Gardens Guild, was formally dedicated July 19, 1966. The "Boy and a Frog" statue, a cement casting of a bronze work by Elsie Ward Hering, sculptress, occupies a place in the center of the conventionally landscaped plot. It was dedicated along with the Herb Garden. The Guild has done an exceptionally fine job of creating and maintaining this garden.

Considerable unanticipated expenses have been incurred during the year, such as replacing the furnace at 909 York Street, etc., but they have all been absorbed, thanks principally to the financial assistance received from many sources.

Our Library Committee acquired a specially constructed case, donated by Mrs. Alexander L. Barbour, for the safe-keeping of rare and unusual books. She also contributed additional funds to the library.

During the year, nineteen botanical organizations held regular meetings in Denver Botanic Gardens. The average number of monthly meetings, including the organizations, was twenty-eight. Courses, for the adult gardening public, lessons in botany and other educational programs were conducted throughout the year with varying attendance. A more specific program is planned for 1967.

Administrative duties, office detail, bookkeeping, maintenance work and publicity were effectively and efficiently cared for, all by our small staff of employees.

Dr. A. C. Hildreth retired as Director of the Gardens August 31st, 1966, and the Board of Trustees conferred upon him the title of Director Emeritus. We appreciate the years of unselfish time and devotion that Dr. Hildreth gave to his work here. He plans to remain in Denver, and we feel certain that he will retain his interest in our work.

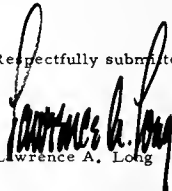
Dr. L. B. Martin, formerly of Los Angeles County Department of Arboreta and Botanic Gardens, accepted the position of Director, as of August 29th. Mrs. Beverly Pincoski was promoted to the position of Botanist-Horticulturist, and Mrs. Alice Willis was retained to handle publicity and public relations.

The Associates of Denver Botanic Gardens, formed in 1964, in cooperation with the Guild and the Around The Seasons Club, launched our most successful Plant Sale in 1966, realizing for Denver Botanic Gardens over \$6,000.00. We are indebted to them

all and especially to the chairman of the Plant Sale Committee, Mrs. Jess Gibson, and her 279 hard-working assistants.

An item of importance concerns the future of Horticulture Hall. You are aware that a part of the funds were raised in our drive. The matter was allowed to "rest" for a few months, then in December authorization was given for a feasibility study to be made to determine what efforts are required to accomplish the desired goal. A subsequent report will be made to the membership.

It has been an honor and pleasure to have served as your President, and I wish now to publicly thank our entire staff, the Board of Trustees, the Executive Committee, Committee Chairmen, and everyone else who has been of such fine assistance in making this another memorable year in the growth of Denver Botanic Gardens.

Respectfully submitted,

 Lawrence A. Long

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CHINESE HIBISCUS

For Colorado Gardeners

A. C. HILDRETH

TROPICAL TREES and shrubs for Colorado gardens are not as fantastic an idea as it may seem. In fact, our gardeners have been growing them for many years. As examples, fuchsias, which we treat as annual bedding plants for shady places, are actually small trees in tropical regions, and *Pelargonium*, the garden geranium, in the tropics is decidedly shrubby.

During recent years, some interest has been shown by Denver gardeners in another tropical tree or tall shrub, *Hibiscus rosa-sinensis*, the Chinese hibiscus. The Denver Parks Department experimented with it for a few years as a possible bedding plant. Cuttings were made in the fall and rooted in the greenhouse. The plants were grown in pots until time for setting them out in beds in late spring or early summer. They flourished and developed into attractive green shrubs. However, as they bloomed only near the end of the growing season and produced only a few flowers, the project eventually was abandoned. The shrubs did not survive the winters out-of-doors.

In the summer of 1965, Denver Botanic Gardens tried out several varieties of this hibiscus under simulated patio conditions. The shrubs were in containers in which they had been grown for nearly a year in a south Texas nursery. They bloomed satisfactorily and attracted considerable public at-



tention. As a result, several container-grown hibiscus plants were offered at the Annual Plant Sale in 1966. Purchasers reported satisfaction with them as patio plants.

Nearly everyone who has visited the Denver Botanic Gardens Conservatory and its auxiliary greenhouses has observed that Chinese hibiscus plants grow and bloom very well under glass. (See Conservatory Plant of the Month article in this issue.) They should be good material for hobby greenhouses.

People who have tried them as house plants are enthusiastic about them. They do well in the warm, dry air of our modern living rooms. If given a sunny location, they bloom almost continuously.

From these experiences it may be

concluded that the Chinese hibiscus is a desirable house plant and a good year-around flowering shrub for a hobby greenhouse. The plants can be grown out-of-doors in our climate only during the frost-free months when they make successful pot or tub plants for the lanai or patio. They are not suitable for transplanting to the garden as bedding plants although specimen plants in containers might be grown and flowered successfully in the garden by plunging the containers in the soil.*

Hibiscus rosa-sinensis is probably native to China but has been widely distributed and is now perhaps the most popular ornamental plant in the tropical and subtropical parts of the world. The plants are evergreen and the foliage is typically dark green and glossy. There are, however, variegated forms with red and white leaf markings. 'Snow Queen' is a cultivar having foliage mottled and splashed with white.

The flowers may be single or of different degrees of doubleness and six

inches or more in diameter. Plant hybridizers have produced some gorgeous named varieties ranging from white through various shades of yellow, orange, pink and red and numerous striking color combinations.

Most of the cultivated varieties can be propagated readily by cuttings, much as geraniums are handled. In general, the plants have no special cultural requirements other than that ordinarily given to woody plants, such as watering, fertilizing and pest control.

Any plant so widely cultivated as the Chinese hibiscus must be adapted to many different kinds of soils. Like most tropical plants it needs a porous, well-drained soil that will insure a good oxygen supply to the roots. Given light and warmth and ordinary care, the Chinese hibiscus will reward the Colorado grower more generously than will most other tropical plants.

*Editor's Note. Chinese hibiscus plants in containers will be offered at the 1967 Annual Plant sale at Denver Botanic Gardens, May 12 and 13.

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1967 ANNUAL PLANT SALE

Bigger — over three times the number of potted plants will be available to customers at the 1967 sale. Plus all types of outdoor plants.

Better — because of having had a full year to carefully prepare and select only choice species and varieties that are **HARDY** in the Denver area.

WALTER WILSON

HARDY CACTI

The sale of cacti at last year's plant sale gave us a better idea of what people wanted. It furnished us with a real challenge and a bigger "goal to accomplish."

Space will not permit listing all the plants available, but I'll mention the favorites requested based on the beauty of the flower, ease of care and how well they fit into those hard-to-grow spots, rock gardens, cactus beds or native theme. Here are a few:

Probably the most sought after cactus in Colorado, as elsewhere, is our *Echinocereus caespitosus*, purple candle, native to the southeastern part of Colorado and very hard to find in the field. This cactus deserves high praise for its exceptionally large, beautiful rose-purple (magenta) flower. Occasionally the color will vary from pink to deep purple. In their natural habitat, the flowers last for one day only but home-grown specimens will stay open for three days, probably due to tender, loving care (more water and less arid conditions). They will tolerate normal watering and can be grown in any flower bed in part shade as well as full sun.

All *Echinocereus* are called "hedge-

hogs." Others in this family are *E. viridiflorus* with pale green flowers which completely skirt many plants resulting in the common name of hen-and-chickens. These are recommended for those hot, dry spots which are well-drained and kept on the dry side. *E. roemerii*, beehive cactus, which grows into a huge clump that looks like a beehive, has orange-red flowers, 2" wide, funnel-form, some recurved petals with purple stamens. It will tolerate normal watering during summer months, likes full sun but will tolerate partial shade. It bears profuse bloom during mid-June into July. *E. triglochidiatus*, strawberry cactus, king's crown or claret cup, has a scarlet flower and blooms freely from mid-June into July. Also has purple stamens, green stigma and lobes (similar to *E. roemerii* and closely related and hybridized). These plants will grow and flower equally well in full shade or sun and will grow into large clumps with normal watering.

Echinocereus coccineus, and varieties, which are known by several common names: bunch ball, Turk's head, heart twister and the variety *Inermis*

(spineless) all have similar flowers to the preceding varieties of *E. roemeri* and *E. triglochidiatus*. As in all cacti there are variations in form and flower. They are all transitions or hybrids. Into this same group we can add *E. gonocanthus*, robust claret cup hedgehog, listed in "Cacti of the Southwest" by Earle (available in our conservatory gift shop). It has scarlet flowers and central spines over 3" long. Will grow equally well in part shade or sun with normal watering during summer months.

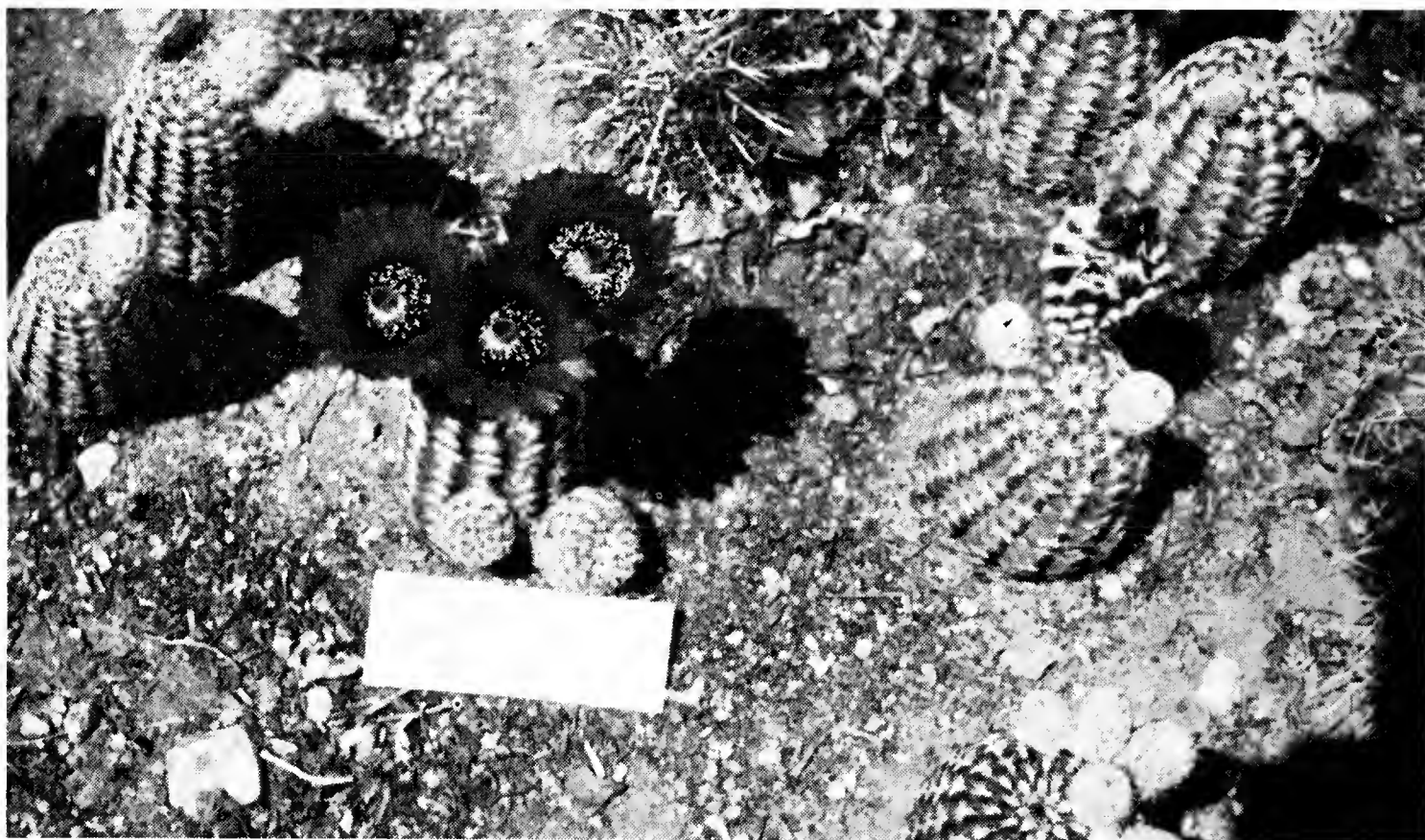
Getting into another group of ball or barrel cacti, *Pediocactus simpsonii*, mountain cactus, has flowers in many shades of pink circling the crown of the plant. Sometimes they vary from white to yellow. We have some unusual forms of crests with multi-heads or off-sets which we call "flower pot pedios," for when they are in full bloom they look like a bouquet of flowers. Pedios are tolerant to lots of water, if in well-drained soil, and they will grow well in part shade or full sun. They start flowering in late April if grown in full sun, later, if in the shade. Colors of

spines vary according to terrain, some actually mimicking the soil in which they grow. For instance, there are white-spined ones, called snowball pedios, and others yellowish to golden, red to rusty brown and off-white to gray spines.

Last year's early sell-out was: *Coryphantha vivipara*, spiny stars, ball cactus. This is another plant outstanding for its pink to pale-purple (magenta) flowers coming out of the top of the plant. It grows best in full sun, is very tolerant of water and partial shade or dry spots if well-mulched.

Another much-requested cactus was *Opuntia arborescens*, tree cactus, cane cactus, bush cactus, etc. Flowers vary from rose-pink to purple. This is a fast grower from cuttings and grows into a large bush (tree) in a few years under cultivation. So allowances must be made for growth. It is more tolerant to dry areas and likes to dry out between waterings, will do well in part shade and, like all hardy cacti, must be kept dry in winter, depending entirely upon normal rain and snow.

There will also be a good selection



PURPLE CANDLE CACTUS

of *Platyopuntias* (flat pads) called prickly pear, dwarf, hunger, starvation, grizzly bear, porcupine, wide, brittle and triangle cactus. All have variable flowers that range in color from golden yellow, orange, salmon, pink, red and scarlet. All will do best in full sun. Some will do well in part shade, but they will flower poorly in full shade. All are ideal for those hot dry spots that get only occasional water. Over-watering and soggy conditions are the nemesis of any cactus.

In the interest of preservation, some of these cacti have been literally "rescued" from areas all over the state where destruction was imminent in the immediate future because of bulldozing many thousands of acres for industrial and housing developments, for new roads and widening of highways. The Colorado Cactophiles have made a continuous effort to preserve these fine cactus specimens wherever it is feasible.

TENDER CACTI

Zygocactus truncatus, Christmas cactus. Highly esteemed as a houseplant for its large, beautiful flowers. Colors range from tinted white through pinkish-salmon, red and magenta (hybrids). They are zygomorphic or "a flower within a flower." In nature, these are epiphytic plants which grow in the crotches of trees. Home care: they thrive on a fine mist spray daily, rich humus and porous potting mix and a dilute plant food every three weeks during the growing period. Soak well when watering, then let dry out between waterings. If the soil remains soggy, the roots will rot and the plants suffocate and die. After blooming, let the plant rest for a month or until new growth appears, then resume normal watering and feeding. Summer care: if possible, place outside in deep shade



Henrietta's *Echinocereus oxypetalum*

under trees or on a cool porch where it is light and airy, out of the sun or with filtered sun, during the frost-free months — June to September. Then return to permanent place in the home.

Late summer rest: several eminent authorities (Haage, Borg, etc.) say that these and similar plants should be rested (water withheld) any time new joints or stems are mature. Time will vary according to each plant's growth. Whether it be June, July or August that you start resting a plant, continue to withhold water until new buds appear at the ends of the joints, then resume watering until after flowering. This is simple but necessary care to produce lots of flowers. These grow well when night temperatures do not drop below 45 degrees, although they do require the cooler nights to build up sugars and energy.

Epiphyllum, orchid cactus, commonly referred to as leaf cactus (misnomer for stem). Do not confuse these cacti with orchids or plants of the *Orchidaceae*. In nature these, too, are epiphytic and some grow in the crotches of trees as pendant plants.

Epiphyllum oxypetalum. A scarce variety among a few private collections and growers in the Denver area. (Often mistaken and mis-named *Nopalxochia phyllanthoides*, which it resembles in form but has a small red flower.) These have large white flowers over eight inches in diameter, flower and corolla tube often over a foot long, pendant, straining every branch to support the weight when two huge buds or flowers are on the same stem. Here in Denver they flower in late August or September as the nights begin to get cooler. They are nocturnal and generally start opening the huge bud at dark (about 8:00 p.m.). Some claim that there is a slow, audible "pop" when the bud bursts, slowly unfolding each perianth segment or outer petal and then each inner petal, one by one, recurving to take its correct place and position to show its beauty best. Finally, each snowwhite stamen takes its allotted place to form a tongue or lip, giving it the illusion of an orchid, hence its name. They have a sweet, spicy fragrance when close and from another room tend to refresh memories of magnolia or orange blossoms. They are generally fully open about 10:00 p.m., remaining so until dawn when they methodically close each part in the same intriguing manner as they opened. Care: about the same for all epiphytes — daily mist sprays to keep foliage fresh; outside in deep shade during frost-free months; bring inside when nighttime temperatures drop to 45 degrees. Keep in cool, airy spot until flowering, then gradually cut down on watering with no fertilizing during rest period. Water about twice a month or only just enough to prevent shrivelling. Signs of new growth appear in the spring when normal watering and feeding can be resumed. Plants thrive on food high in nitrogen such as 12-6-6.

Epiphyllum ackermanni (sometimes mistaken for other named varieties). This is a beautiful hybrid which originated in England. It is the most free-flowering of all species of *Epiphyllum* and deserves high praise for its dazzling red flowers that measure 2½" in diameter on well-established plants, and they will remain open for several days. Care: The same as most epiphytes, *E. oxypetalum*, and others called orchid cactus.

Echinopsis cactus, commonly called Easter lily cactus because of the similarity of flower and form. Many of these plants vary because of origin and flowers which range in color from pure white to pink and shades of red. They are easy to grow and are very tolerant of water if allowed to dry out between waterings. The parents of these hybrids originated high in the Andes Mountains in South America. Until they have been cultivated outdoors in Denver in order to adapt them to the climate, the only way to grow them successfully is to bring them inside for the winter. Give them a light, cool spot with all possible sun. Keep on dry side, watering only about once a month, during winter. In spring, when they show signs of growing, spines start showing new color and normal watering can be resumed. Since these houseplants are not completely hardened off to full sunshine, place them under some protective shade, gradually exposing them to more sunlight. In a few weeks they can be placed in ANY flower bed for the summer.

We want to thank Raymond Carlson, Editor of *The Arizona Highways*, for the many years of work he has devoted to extolling the beauty of cacti and for promoting appreciation of these wonderful plants and other native flora. He has repeatedly stated: "They are the LOVELIEST of flowers."

More Plant Sale News

TREES AND SHRUBS

AVALONNE KOSANKE

THIS YEAR'S offerings of trees and shrubs should intrigue the most adventurous gardener while reassuring the more practical one. More than half the list is concerned with plants already nature-tailored to this area's peculiar growing requirements. The rest range from the unusual to the highly speculative, for it is the intent of this committee to promote broader use of less known, less grown species through this sale. The committee guarantees only this: with one exception, all plants listed are already being grown successfully by someone in this area.

There will be more than twenty species of trees, and only a few of each. Three oaks appear on the list. First, *Quercus gambelii*, our rather small, tough, native Gambel oak which can take almost anything Colorado weather offers. *Quercus macrocarpa*, the bur oak, is to be found in several extensive plantings here. This magnificent tree develops an interesting, irregular head, and its twigs thicken with corky ridges. It is rugged looking and has an excellent reputation for adapting to many different growing conditions. The third oak is *Quercus borealis*, the red oak, which grows in a more formal manner. It is a living symbol of permanence, the choice of long-range planters. Its thick, green leaves may turn yellow, dull red, orange or brown in fall depending on factors present in the tree

itself, in its growing conditions, or even in the weather.

Smog-conscious gardeners will appreciate *Sophora japonica*, the pagoda tree, long known for its resistance to city toxins. In 1747, it was introduced to France from the Orient where it had long been associated with the temple gardens. Its pinnate leaves and always-green bark attract much attention. Great panicles of creamy flowers are borne from every shoot during August, which is an admittedly quiet time in the garden. Once its roots are established, this aristocratic tree will develop rapidly and likely will outlive its planter, for it tolerates city life and is also disease-and-insect-resistant.

Several patient gardeners have waited three years for *Alnus glutinosa*, the charming little black alder found growing in City Park. Our favorite nurseryman promises just a few of these in five-gallon cans, exactly right for tucking into your yard.

Our exception to the "being grown successfully" rule is the spanking new *Malus* called 'Royalty' crabapple. This exciting introduction was originated by W. L. Kerr at the Dominion Experiment Station at Morden, Manitoba, Canada. Local nurserymen who saw it growing at Helena, Montana, feel it will do exceptionally well here. Its lacquered, purple-red leaf and single red bloom followed by persistent red

fruit make it outstandingly see-worthy throughout the growing season. It forms a dense, broadheaded tree about twelve feet tall, just right for our city lots.

Attractive screening hedges are a problem for many homeowners. Three such plants have been selected, each to fill a specific need. For a quick, tall, narrow screening hedge, we suggest *Rhamnus frangula columnaris*, 'Tallhedge', Pl. Pat. 1388. With no trimming, this handsome plant limits itself to a four-foot span and can be grown any height up to 12 feet here in Colorado. From the ground up, 'Tallhedge' offers a solid wall of glossy green leaves. It is disease-resistant, smog-tolerant, hardy to 20 degrees below zero and has no special soil requirements.

For year-around pleasure, it would be difficult to improve on the less formal *Euonymus alatus compactus*, called burning bush. The interesting cork-winged branches of winter disappear under rich green foliage sparked by yellow flowers. By late summer the red berries appear and last well into fall when the show-stopping, coppery-red leaf coloring steals the scene.

Compactus cues the planter to the dense, low growth habit, never over five feet, which makes burning bush ideal for hedging or ornamental use.

Flower arrangers have not been forgotten. They will fall in love with the new "all-fruiting" *Celastrus scandens*, bittersweet, located by one grower. Only a single plant is needed to pro-

duce great panicles of bright orange berries. This climbing shrub will screen out a telephone pole or enhance a shed all summer before exposing its ripe orange wealth in the fall.

For unusual landscape effect and flower arrangers, two willows are listed: *Salix sachalinense* Sekka, the Japanese fan-tail willow, and *Salix matsudana tortuosa*, the corkscrew willow. Both will be available in limited supply.

Cotoneaster apiculata, the cranberry cotoneaster, boasts the largest fruit of this hardy series. It sends its branches curling and tumbling along a wall. Cold weather brings a burst of glowing red into the leaves which persist well into November.

Nandina domestica, Heavenly bamboo, is a luscious tidbit which must be grown in a protected spot. When treated as a perennial, the new shoots become more numerous each year, unfolding luscious, red-tinged leaflets which remain lovely most of the winter.

A much hardier broadleaved evergreen is *Pyracantha lelendi wyatti*, or firethorn, whose bright orange berries remain all winter until the returning birds clean them off. This variety has proved vigorous here, growing more beautiful each season, even though generously trimmed for enjoying its berries inside.

At least 15 other species of shrubs, including five viburnums, will be available on a "first come, first served" basis.

"Go, then and plant a tree, lovely in
sun and shadow . . . Blessings of dew
and shade, hereafter shall be thine."
(From "The Planting of a Tree" by
Marion C. Smith.)

GARDENING

Aux Fines Herbes

MARILYN A. HOLMES

SOME PEOPLE call them weeds, but to anyone who grows culinary herbs they are interesting and useful garden plants. With their subtle fragrance, ease of cultivation, and practical cooking applications, they are fast becoming popular in Denver gardens.

Herbs are not new. Parsley, mint and thyme are mentioned in the Old Testament, and many herbs are steeped in ancient legends and myths. Adding a few herbs to the garden can lead to fascinating reading, culinary experiments and a collection of interesting houseplants.

For a novice gardener, culinary herbs can be especially rewarding. Most of them thrive in average soil,

take up little space and are easy to cultivate. Even in Denver with the limited amount of moisture, a variety of herbs can be grown which will survive the cold weather, and the less hardy plants can be brought inside to be used throughout the winter.

Formal patterned herb gardens, such as the one at Denver Botanic Gardens, are beautiful but require extensive maintenance and usually produce more herbs than the average family will use. If you do your own gardening, it's a good idea to start small and add herbs wherever they will fit into your garden. A small variety, with one or two plants of each species, should be sufficient to begin an herb garden.

Following is a list of culinary herbs that should grow in this climate.

NAME	CHARACTERISTICS and CULTIVATION
Angelica atropurpurea American Angelica	Biennial, 6-8' tall, white flowers. Shade or partial shade.
* Pimpinella anisum Anise	Annual, 2', yellow blossoms. Grows slowly. Plant early in sun.
*† Melissa officinalis Balm or Lemon Balm	Perennial, 1½-2', yellow blossoms. Partial shade.
*† Ocimum basilicum Basil or Sweet Basil	Hardy annual, 2-2½', white blossoms. Plant 12" apart.
* Monarda fistulosa Bergamot	Perennial, 2-3', mauve flowers.
* Borago officinalis Borage	Hardy annual, 2½', blue flowers. Good for rock gardens.
*† Sanguisorba minor Burnet or Salad Burnet	Perennial, 1-2', rose and white flowers. Plant 10-15" apart.
* Matricaria chamomilla Camomile	Hardy annual, white flowers, 15" tall. Sow seed early spring; spreads.
Carum carvi Caraway	Hardy biennial, self-sows, 2' tall, yellow flowers; sow 2' apart.
* Nepeta cataria Catnip or Catmint	Perennial, blue-mauve flowers. Thin to 12-16" apart.
* Myrrhis odorata Cecile, Sweet	Perennial, white blossoms, 3' tall.
* Anthriscus cerefolium Chervil	Annual, 18-24", resembles parsley, white flowers, shade or part shade. Cultivate like carrots, handle carefully.
*† Allium schoenoprasum Chives	Perennial, 8-10" in clumps. Lavender flowers; bulbs, but can grow from seed. Multiplies.
* Coriandrum sativum Coriander Seed	Perennial, pink flowers, 10-24".
Valerianella olitoria Corn Salad or Field Salad	Annual, 8-10", mild, blue flowers. Plenty of water, plant in spring, thin to 6".
* Chrysanthemum balsamita Costmary or Bibleleaf	Perennial, 3-4' clumps, yellow flowers. Shade. (For blossom, plant in sun.) Divide every 3 years.
* Lepidium sativum Cress, Land Cress, Peppergrass	Annual, 3-6", white blossoms, partial shade or window box.
Cuminum cyminum Cumin Seed or Comino	Perennial, 5-6" tall. Delicate, requires careful cultivation and irrigation. Start from seed inside.
*† Anethum graveolens Dill	Annual, up to 3' tall. Yellow flowers. Self-sows, spreads, does not transplant well. 18" apart. Stake.
*† Foeniculum vulgare, var. dulce Fennel or Sweet Fennel	Perennial, sometimes grown as annual. Yellow flowers. Plant late.
Allium sativum Garlic	Annual, bulbous like onion. Plant early spring.
Garlic, Oriental	Perennial, 18", space 6" apart, full sun.
*† Pelargonium capitatum Geranium, Rose	Annual, 3-4', outdoors, loamy soil.
* Marrubium vulgare Horehound	Perennial, 18", white flowers. Tendency to winterkill.
* Hyssopus officinalis Hyssop	Perennial, hardy, 2', blue, pink or white flowers. Plant seed in partial shade. Cut back after first blossoms.
* Helianthus tuberosus Jerusalem Artichoke	Annual, yellow flower, 12' high.

Editor's Note: *Planted in Denver Botanic Gardens Herb Garden.

40 †Suggested for a beginning herb garden.

Lemon balm, catnip, chives, costmary, oriental garlic, mint, sorrel, French sorrel, tarragon, thyme and other herbs will be available at the Annual Plant Sale.

USES

Leaves — fish, shellfish. Stalk — like rhubarb, celery.

Leaves — fruit, sauces, soups, shellfish. Seed — cakes, cheese, meats.

Leaves — beverages, wine cups, teas, meat, salads, sauces.

Leaves — eggs, fish, game, meats, shellfish, sauces, peas.

Leaves — tea, garnish for fruit and wine drinks.

Young leaves and tips — iced drinks, salad, teas, vegetables. Use in place of parsley.

Leaves — vinegars, teas, salads.

Leaves — herb tea.

Seed — soups, meats, vegetables.

Leaves — cheeses, meats, salads, soups, bread, cakes, pastries.

Leaves — soothing teas.

Leaves, blossoms, seed — seafood. Licorice tang, like Fr. Tarragon.

Leaves — flavoring and garnish.

Leaves — cheese, butter, eggs, sauces, soups, salad dressings.

Seed — confections, cheese, fruit, meat, pickles, salad, soups, demitasse.

Leaves — salad, garnish for meat, seafood. Used as vegetable.

Leaves — cakes, game, meats, poultry, teas.

Eaten when few inches tall.

Seed — breads, cookies, cheese, eggs, fish, poultry, game, meats, vegetables.

Leaves and tips and seeds — cheeses, fish, eggs, meats, pickles, poultry, salad dressings, vegetables, and soups.

Leaves — fish, salads, soups.

Seeds, crushed — confections, cheeses, shellfish and vegetables.

Bulbs — salad dressings, shellfish, meats, pickles, poultry, sauces, soups.

Leaves — salads. No garlic after-taste.

Leaves — custard, baked fruits, puddings, ice creams, jellies.

Leaves and flowers — cakes, cookies, candies, sauces, meat stews, teas.

Leaves — fruit cocktails, fish, game, meats, pies, salads, soups, stews.

Tubers used like potato.





FORMAL HERB GARDEN AT DENVER BOTANIC GARDENS

Planted and Maintained by Denver Botanic Gardens Guild

STATUE: Boy with Frog by Elsie Ward Hering

NAME	CHARACTERISTICS and CULTIVATION
* Lavandula officinalis Lavender, spike	Perennial, shrubby, small. Sunny dry soil. 12-15" apart.
Allium porrum Leek	Annual. Milder member of onion family. Strong aroma. Started from seed. Thin to 6".
* Levisticum officinale Lovage or Love Parsley	Perennial, 5-7'. Blossoms June-July.
* Calendula officinalis Marigold, Pot	Annual. 1-2' high. Rich loam. Blossom early and all summer. Plant 18" apart.
*† Majorana hortensis Marjoram, Sweet	Perennial, grown as annual, winterkills easily. 12-15", white blossoms.
* Majorana onites Marjoram, Pot	Smaller variety, purple flowers.
*† Mentha Mint	English, black-stemmed, curly, apple – many varieties. 3' tall, moist soil, sun or part shade. Thin by pulling runners. Remove flowers. Perennial.
* Tropaeolum majus Nasturtium	Annual, tender, seedlings thinned to 8" apart or more.
*† Origanum vulgare Oregano	Perennial, white flowers, similar to wild marjoram, sometimes treated as annual. 3' high. Start from seed or crown division.
*† Petroselinum crispum Parsley	Biennial, grows easily. 10" tall. Part shade, water frequently.
* Mentha pulegium Pennyroyal, English	Tender perennial, self-sows.
*† Rosmarinus officinalis Rosemary	Perennial, grown as annual. Limy soil, protected spot. Cut slip to bring inside for winter. 2' tall.
*† Salvia officinalis Sage	Perennial, 2' tall, space 18" apart in sandy, dry soil. Full sun. Do not over-water.
* Satureja hortensis Summer Savory	Annual, 18", space 6" apart, full sun. Will re-seed.
* Satureja montana Winter Savory	Perennial, 15", self-sows, deep blue flowers or pinkish-white.
* Rumex acetosa Sorrel or Garden Sorrel	Perennial, full sun, 3'.
Rumex scutatus Sorrel, French	Perennial, almost prostrate, space 1' apart.
* Tanacetum vulgare , var. crispum Tansy or Fern-Leaved Tansy	Perennial, 2½-3', yellow flowers. Moist soil, rows 3' apart. Spreads.
*† Artemisia dracunculus Tarragon or French Tarragon	Perennial, 18-24" tall, space 18" apart. Sun or part shade. Divide every 3 years.
*† Thymus serpyllum (many varieties) Thyme	Perennial, bushy, spreads.
Thymus vulgaris Thyme, English	Perennial, 1' tall, purple flowers.
* Lippia citriodora Verbena or Lemon Verbena	Tender perennial. Full sun. Propagated from cuttings. Truly lemon scent.
Nasturtium officinale Water Cress	Perennial, 5-6" high, in water.
* Asperula odorata Woodruff or Sweet Woodruff	Perennial, spreads, 12" tall. Shade or partial shade.

Editor's Note: *Planted in Denver Botanic Gardens Herb Garden.

†Suggested for a beginning herb garden.

USES

Flowering tips used commercially. Flavoring for beverages, jellies, sachets.

Fresh tops and roots — soups, salads.

Leaves — soups, seafoods, salads, sauces.

Seeds — cakes, candies, meat, game, salads. Stems — blanched, eaten raw like celery.

Petals — seafood, stews, game and roast meats.

Leaves — eggs, fish, game, meats, poultry, salads, sauces, soups, stews, stuffings and vegetables.

Leaves — eggs, fish, game, meats, poultry, salads, sauces, soups, stews, stuffings and vegetables.

Leaves — teas, jellies, vegetables, sauces, lamb, fruits, candy.

Foliage and petals — canapes, salads. Seed and seed pods — mixed pickles.

Substitute for capers in food, sauces.

Leaves — same uses as majoram, flavor more pungent.

Leaves — canapes, eggs, fish, shellfish, meats, poultry, salads, sauces, vegetables.

Contains: calcium, thiamin, riboflavin, niacin, Vitamin C.

Used mainly for teas.

Leaves — pork, eggplant, salads, soups, gravies, lamb.

Leaves — cheeses, fish, shellfish, game, meat, poultry, soups, sauces, stuffings, stews, teas.

Leaves — meats, soups, salad, vegetables, beans.

Same as Summer Savory.

Young fresh leaves — salads, omelets, soups.

Young fresh leaves — salads, omelets, soups.

Leafy tips — omelet, baked fish, meat pie, tea.

Leaves — eggs, fish, meat, poultry, salads, soups, sauces, vinegar.

Leaves — seafood, cheese, Bouquet Garni, vinegar, eggs, vegetables, stews.

Leaves — seafood, cheese, Bouquet Garni, vinegar, eggs, vegetables, stews.

Leaves — fruit salads, iced beverages, jellies, custards.

Leaves — garnish, biscuits, breads, eggs, fish, meat, pastries, salads, soups.

Leaves — herb tea, fruit beverages, garnishes and May wine.



Sage



Marjoram



Bay

Most herbs want full sun, sandy soil and good drainage. In too heavy, rich soil they run to lush foliage but lose some of their essential leaf oils and fragrance. By all odds, Denver gardeners should have some of the best herb gardens in the country, for most culinary herbs do not need a great deal of water. Dry heat will help develop the leaf oils. Most popular culinary herbs are also free from plant diseases, especially when they are grown in small quantities and not over-crowded. Even if your gardening space is limited to a window box, you can grow culinary herbs.

Herbs may be used fresh, dried or frozen for winter use. Besides their usefulness in the kitchen, some of them may be used for sachets, pot-pourri, lotions and sweet-scented moth preventives.

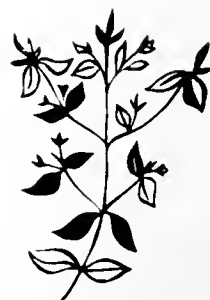
A complete list of all herbs that have been or are being grown for culinary purposes is impractical for they fall in and out of favor with different generations and eating habits.



Tarragon



Rosemary



Thyme

More Plant Sale News

Rock Garden Plants

BERNICE PETERSEN

FOR THE sun-parched slope or protected shady nook more than 50 kinds of rock garden plants will be offered at this specialized booth.

Among the choice plants grown especially for the sale are three low-growing bellflowers: *Campanula garganica*, graceful sprays of starry blue flowers with white eye; *C. muralis*, light blue-purple, bell-shaped flowers; and *C. poscharkyana*, larger and more vigorous than *C. muralis*, with up-facing, lavender-blue flowers in profusion.

Androsace lanuginosa, rock jasmine, is appealing with lacy green leaves and umbels of dainty pink or white flowers. *Saxifrage umbrosa*, 'London Pride', grows in neat rosettes bearing clouds of pink, starry blossoms. All of the foregoing plants prefer light shade.

Seldom available is *Carlina acaulis*, stemless thistle of the Alps, a dwarf perennial with silky, white flower heads about 2" across. Another jewel is native blue-eyed grass which blooms only in sun in the forenoon and likes moisture.

Included in the best ground covers for this area are the following natives which retain foliage all year: *Antennaria*, pussytoes, grey foliage, flowers pink or white, excellent between flag-

stones; *Eriogonum*, sulphur flower, green or grey foliage, yellow blossoms, also ground-hugging. *Mahonia repens*, hollygrape, good in sun or shade, drought or average moisture, will grow 12"-15" high, but stands vigorous pruning. Its yellow flower clusters are followed by blue berries suitable for jelly.

Visitors to this booth are invited to look and learn. Lists suggesting plants suitable for various growing conditions will be given to interested persons.

Perennial Plants

PEG HAYWARD

A VARIETY OF perennial plants will be available at the 1967 Denver Botanic Gardens Plant Sale. Included will be plants for both sunny and shady spots in the garden. Some of the familiar favorites suitable for the perennial border which will be offered are: *Achillea*, yarrow — *Anchusa italica*, dropmore — *Anthemis*, golden marguerite — *Aquilegia*, columbine (McKana Hybrid) — *Chrysanthemum maximum*, shasta daisy — *Delphinium*, Pacific giant — *Dicentra spectabilis*, bleeding heart — *Heuchera*, coral bell — *Lupinus*, Russell's Hybrids — *Papaver nudicaule*, Iceland poppy — *Pyrethrum*, painted daisy, *Phlox decussata*, hardy phlox, peonies and others.

The perennial booth will carry some of the more unusual varieties for the gardener who wishes to try something different. Included will be *Astilbe*, *Geum*, avens, *Lythrum*, *Penstemon barbatus* — *Palemonium*, Jacob's ladder — *Dictamnus*, gas plant — *Saxifraga bergenia* and others.

A special feature will be a variety of colorful hardy chrysanthemums, a favorite for the autumn-flowering garden.

Colored pictures of the perennials for sale will be displayed in order to help the buyer in making a choice. Information about the plants and their culture will be available.

Annual Plants

DOROTHY CARROLL

WHETHER NEW or "tried and true," the best varieties of annuals suited to this area will be offered at the 1967 Plant Sale, May 12 and 13.

'Golden Jubilee' marigold, 1967 All-American selection, boasting giant golden-yellow blossoms on compact, bushy plants, as well as 'Sun Souffle' and 'Tangerine', both outstanding at the Denver Botanic Gardens test trials, will be among the various marigolds ranging from dwarfs to 30" plants.

Among the best of the 100 varieties of petunias tested here last year a newcomer, 'Red Cap', will compete with reliable 'Comanche', a leading red. At least a dozen varieties of petunias will be available including the all-time favorites at the Gardens 'Seafoam', large single white, and 'Sonata', double white. Among the delicate colors is the charmer 'Pink Cheeks'. Yellows, blues, purples and bi-colors have been chosen to mix or match.

Ageratums 'Blue Blazer', deep blue, and 'Blue Mink', powder blue, both

heat-resistant and sturdy, make neat edging plants.

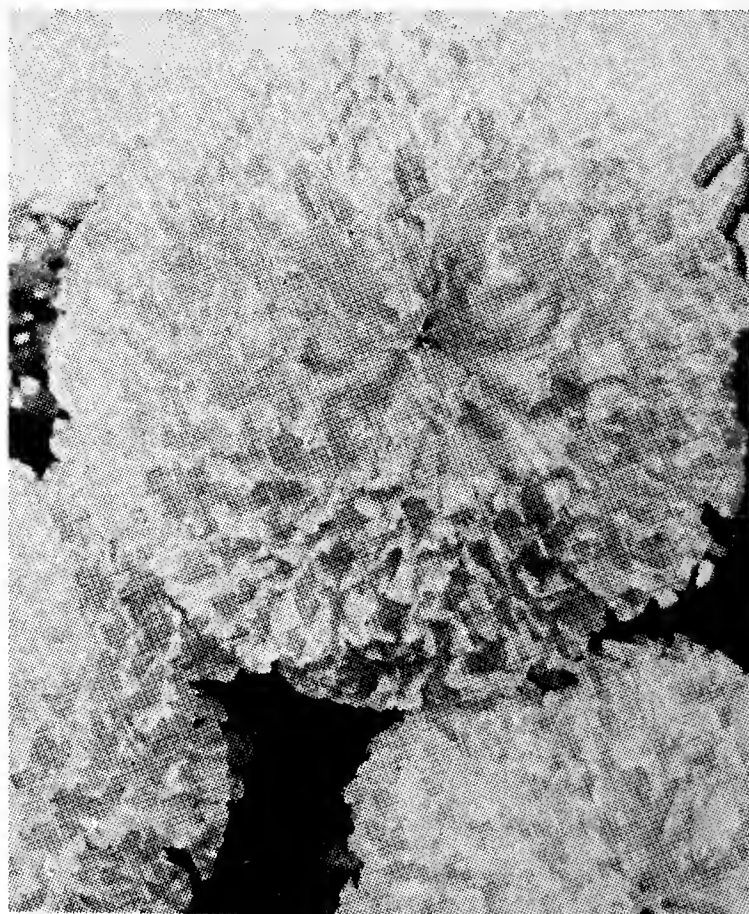
Introduced at last year's sale, 'Bright Butterflies' snapdragons delighted gardeners with their open and appealing faces (the lip does not close). Rocket snapdragons, best by test in this area, will be offered in many colors. Dwarf 'Floral Carpet' is equally adaptable as an edging plant or for use in patio planters.

Combine fountain grass and cannas to duplicate the effect created in city parks last year. If space is limited a few will provide unusual interest in the flower border.

For contrast in foliage choose fragrant 'Dark Opal' basil or dusty miller. Coleus give quick color in sun or shade.

Geraniums, ivy-leaved Martha Washington, or the hardy Irene strain, in many colors are offered for borders, hanging baskets, planters or Mother's Day gifts.

Your chance to buy choice locally-grown plants at this annual sale will further the goals at Denver Botanic Gardens. Let's grow together!



Golden Jubilee Marigold by Badger Seed Company

Venturesome Adventures or

How Did Those Dandelions Get Here?

M. WALTER PESMAN

AUNT TANY CUMMINGS was homesick. She had come to the ranch near Elizabeth, Colorado, as a bride. It was a desolate region back in the seventies — a far cry from New England where she had spent her girlhood.

If only she could surround herself with some of the New England flowers and other plants, she figured, it might be more like home. So she sent there for an assortment, some to be used for ornament and some for food as in salads and relishes.

Among the arrivals was *Taraxacum officinalis*, the bright and cheery dandelion which she had used as greens back home. The French to this day advertise dandelion seed in flower catalogues for that purpose since one grows dandelions in the garden along with lettuce, endive and parsley.

Elizabeth's soil was to the dandelions' liking; they grew, they thrived, they scattered their seed wide and far. Where no golden heads had appeared before, now arose gorgeous fields of luscious leaves and bright blooms. This, according to Dr. Edward R. Mugrage of the Colorado University Medical Center, was the beginning of the "ornery pest" around 1873.

At present, there is hardly a spot in the high mountains and on the widespread plains where the golden carpet does not delight the eye at some time from May to July. *Taraxacum officinalis* likes it here and intends to stay after its long trek from Europe.

Of a slightly more recent date is Dr.

Mugrage's story of the arrival of *Salsola pestifer*, Russian thistle, around 1885. Here his own cousin in Radium, Colorado — Mr. Ohio Columbus Mugrage — noted amidst the grass "a very pretty plant growing up bushy, which stood out as large as a small keg and which in fall turned color, broke off and drifted across the meadow finally to disappear." The next spring its path was well marked with hundreds of small Russian thistle plants, and he felt certain that this was the beginning of the seed, at least in Grand County.

Few other records are available about the spread of this common pest, appropriately named *Salsola pestifer*, at least as far as Colorado is concerned. A simple statement in the herbarium of the Colorado A. & M. College says: "introduced in Colorado near the waters of the Arkansas Valley in 1892, and by 1896 had been carried half-way across Kansas by the Arkansas River."

According to Professor Burton O. Longyear, (in his "Rocky Mountain Wild Flower Studies") the farmers in South Dakota first noticed this "tumbleweed" invading their flax fields in the years 1873-74. It had come in from the plains of eastern Russia, together with imported flax seed. Before long, the newspapers began to warn farmers to be on the lookout for this rapidly-spreading pest. Farmers' bulletins and circulars were distributed with suggestions for clean cultivation, seed prevention and other remedies against annual weeds. But the Russian thistle

won out and now can be seen by the millions as it is swept by plains' winds after having been detached at its slender base.

They pile up in windrows against wire fences and collect in great masses in protected corners. Every change of wind puts them on the march again, hopping and rolling, scattering seeds at every jump!

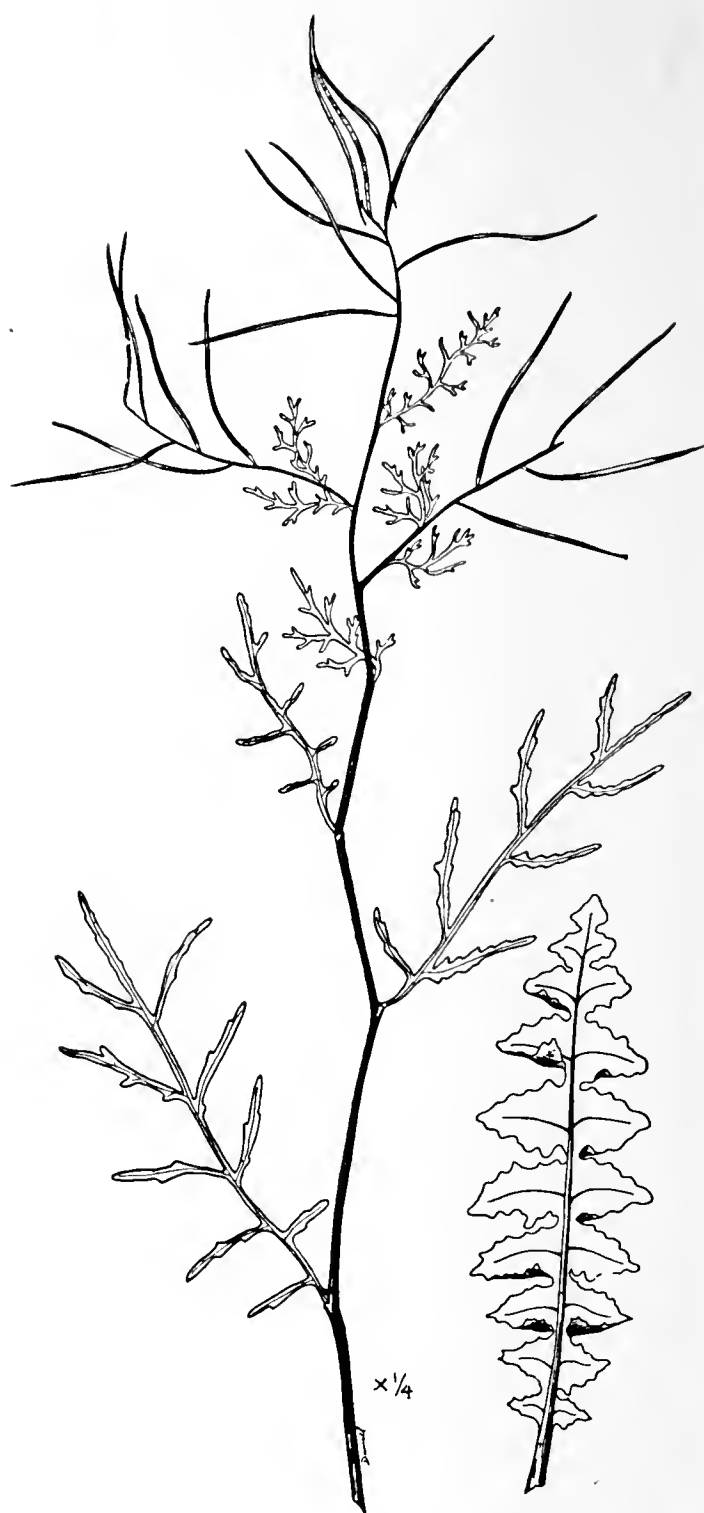
No modern plains picture is complete without evidence of this new invader. Another adventive has been added.

Here, then, are two striking examples of recently introduced pests within knowledge of some of the pioneers who are still alive.

One more plant immigrant of even more recent date should be particularly mentioned: *Sisymbrium altissimum*, tumbled mustard, an old-time resident of Hungary and other European countries, which migrated to the rest of Europe and then spread over a large part of the temperate zone of Europe, Asia and North America.

As it happens, I had the opportunity to personally report it first from Denver in 1913 (to Dr. Aven Nelson of the Rocky Mountain Herbarium in Cheyenne). I had been struggling desperately to trace it down in Coulter and Nelson's Manual, insisting in my mind that such a common plant must be listed. Failing to find it listed there, I identified it in a Flora of the Netherlands and then, later, was informed by Dr. Nelson that it had already spread over many parts of Wyoming. The herbarium specimen is from Sulphur Springs, dated August 8, 1907. The Colorado University Herbarium has no record until May 27, 1919 (from Denver). Even as late as 1945 the Colorado A. & M. Herbarium failed to list it.

When did it arrive in North Amer-



Tumbling Mustard

ica? The earliest authentic record is a specimen in the National Herbarium collected in Philadelphia in 1878. In 1883 it was seen near Kansas City, Missouri; in 1892 it was well established near Aberdeen, South Dakota, and the following year was collected at seven different points within ten miles of that city.

Appropriately, tumblemustard is called Jim Hill mustard in the northern part of the country, in reference to James J. Hill, whose Great Northern Railroad transported seeds of tumblemustard (yes, free of charge!) along

with hay, grain and livestock, thus speeding up its spreading.

It wouldn't be difficult to multiply examples of newly introduced plants. A region, such as this, which is comparatively "new" as far as human habitation is concerned, offers a fruitful field for the tracing of new plants from other regions. Europe and even New England have had a long time to be inoculated with introductions from almost the entire world. Only occasionally does a plant from out-of-the-way places find its way there now.

Sometimes the new plant carries its history in the name given to it after its introduction. Russian thistle is an example. Even the name of its introducer may be attached to it. As an illustration we may draw attention to the colorful *Linaria vulgaris*, commonly known as butter-and-eggs or yellow toadflax, which now flourishes along many roadsides in the foothills — significantly common in the neighborhood of our early mining towns. It is sometimes called Ramsted weed and said to be so named after the person who introduced it into the United States.

Just a few years ago, in late July, my attention was drawn to a dainty,

pretty plant in Bear Creek Canyon, east of Morrison, near Denver. Its white flower clusters with four-petaled blossoms, showed it belonged to the mustard family. Unlike most of its close relatives, it has split petals and very interesting winged stamens, toothed at their base.

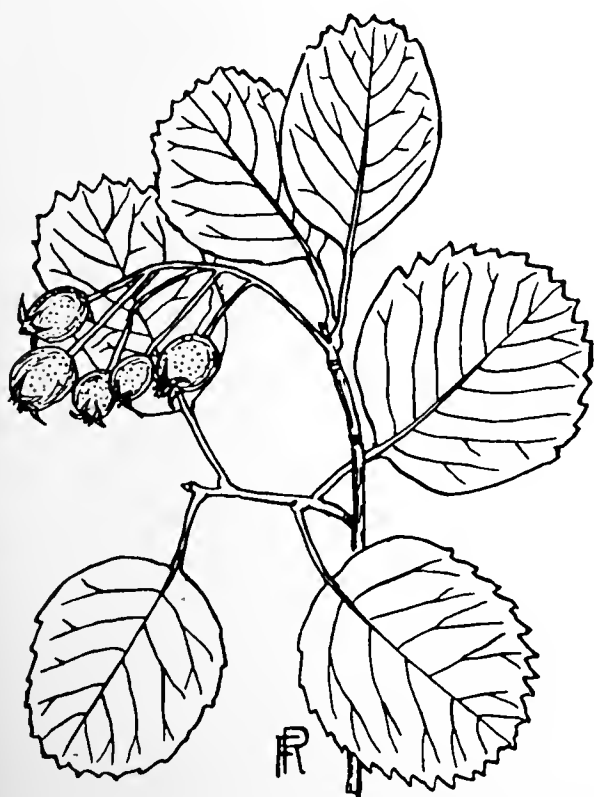
This plant had not been reported in any manual of the region. Again, it could be traced in a European Flora as *Berteroa incana*, falsealysium. Dr. H. D. Harrington of Colorado State University verified this identification. How did it get to Bear Creek Canyon, where it evidently feels at home? How rapidly will it spread? Has it appeared in other, similar spots where the local climate is like the climate in its original home? Who knows?

Another fairly recent introduction is a pretty spurge, *Euphorbia esula*, with greenish-yellow flower clusters and many willow-like leaves. It likes moist roadsides in the neighborhood of Boulder and Denver. I called it leafy spurge after failing to find it listed in the earlier manuals. It must have come in around 1910 (according to my guess).

Very definitely escaped from the nursery and now thoroughly at home in the bottom of river and creek beds is *Tamarix gallica*, the French tamarisk, with fine-textured foliage and light-purple flower plumes.

More recently *Eleagnus angustifolia*, Russian olive, and since 1940 or thereabouts *Ulmus parvifolia*, Chinese elm, are commonly found in similar moist places.

Less pleasant, but equally interesting, is the gradual invasion of noxious weeds into a new country. In some cases we can pinpoint their first occurrence, especially since government and state agencies are on the lookout for them. Thus *Halogeton glomeratus*, halogeton, came into this state about



June Berry

1952. It is poisoning sheep and, being introduced from Asia, is spreading out from a focal point in eastern Nevada.

Swainsonia salsula, a pretty, brick-red pea with creeping roots, is not poisonous, but is apt to become a noxious weed. It was first reported in the San Luis Valley some time before 1940 and is now spreading. It was introduced with Turkestan alfalfa seed.

After delving into the history of all of these immigrants and upstarts, parvenus, undesirables and what have you? — let us start at the other end.

Who are the “First Families Among Plants” in this region? Who should be listed in the “Blue Book of Well-Established Dignitaries”? Whose genes are undefiled and stable? The term “old fossils” should be applied here not without reverence; it is they that must be consulted. Professor T. D. A. Cockerell, authority on Rocky Mountain fossil plants, has recorded a large number of species that used to grow at Florissant and other places in Colorado.

These Florissant Beds contain some of the most widely known fossil plants. Harry D. MacGinitie made a comprehensive study of them, using modern techniques in the interpretation. He recognizes as many as 114 species distributed among 44 families. Some of these are no longer native in North America. There is, for instance, *Ailanthus*, Tree of Heaven, now found in Asia, and *Koelreuteria*, Goldrain-tree, of China and Japan.

Evidently, the climate was warmer then. Along stream courses there was a copious forest growth, requiring considerable rainfall. Interestingly enough, we notice among these fossils a number of eastern and southern trees, not now found in the region. Among these are soapberry, acacia, redbud and walnut. Most prevalent of all was *Fagopsis longifolia*, a member of the birch family.

Willows, cottonwoods, alders, oaks, hackberries, Juneberries, sumacs and a number of others left their leaf imprint, clearly enough to be recognizable. We must count them among the First Families of the region.

On higher ground pines and evergreen oaks dominated open scrub forests. Even some laurels are found.

When did all these trees flourish here? MacGinitie concludes that the Florissant Beds date from the Oligocene age — shall we say some twenty million years ago? It is more than likely that these forests continued through the Pliocene and Pleistocene eras into the present day. Man, the parvenu, did not appear until the late Pleistocene which brings us down to only a million or so years ago.

The facts related here have been and still are of great interest to botanists and nature-lovers and it is hoped that they will be of equal interest to the reader.



Alder (*almus tenuifolia*)

In connection with the foregoing article by Mr. Pesman, the following news item should be of interest to our readers.

A bill to designate the fossil beds at Florissant, Colorado, as a national monument was introduced in the House Thursday by Rep. Frank Evans, D-Colo. Evans said the valley is the bed of a prehistoric lake and "is one of the most important paleontological resources in the world. . . . During the oligocene period fine volcanic ash spewing from nearby volcanoes settled

layer by layer in the lake. As it settled, the ash encased and preserved the various flora and fauna which lived around the lake. Today, just a few inches below the sod, you can find beautiful fossils ranging from delicate butterflies and tiny spiders to the leaves and massive trunks of giant redwood trees. The unique process of fossilization which took place at Florissant preserved many forms of life which are never seen in fossil form elsewhere." From the *Denver Post*, February 17, 1967.

AN ORNERY 'CRITTER'

Dermacentor Andersoni

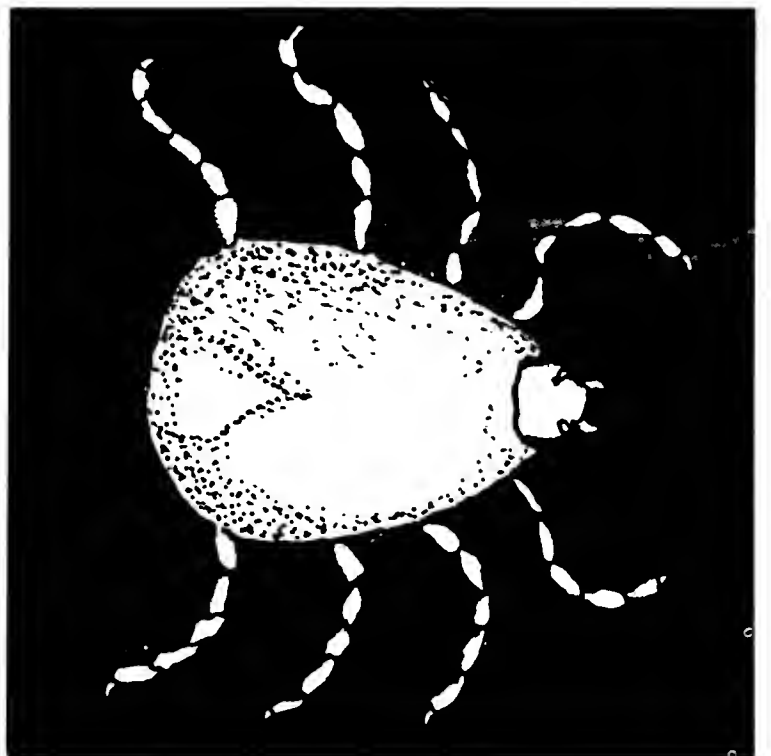
DR. FRED N. ZEINER

THERE ARE many types of ticks (tics), and the terms mean very different things to the clock-maker, the physician, the taxonomist and the woodsman. With the hope that *Green Thumb* readers really get out of our beautiful conservatory and into the woods in the hinterland of Denver, it becomes appropriate at this season to discuss our common wood-tick, *Dermacentor andersoni*, even if it is merely a member of the animal kingdom.

At a distance, it appears as a small (3 mm.) brownish object. Closer inspection shows it to be a rather handsome, reddish-brown beast, with the larger dorsal shield of the male and the smaller one of the female having obvious markings of silver (really a dirty gray). There are eight legs in contrast to other insects which have six. The body is very flat.

Dermacentor andersoni, is prevalent

in the northwest quadrant of the United States. Larvae and nymphs feed on the smaller mammals, e.g., ground-squirrel, cotton-tail rabbit, squirrel and other small rodents. The adults prefer the larger mammals such as deer, elk,



Cont. on page 54

horse, cattle, dog and human. The ticks hibernate during the winter as either nymphs or adults. With the onset of warmer weather, they become active. The nymphs attain adulthood, and they then attack any large mammal that is handy. Following their meal they drop off the host, breed, and eggs are deposited.

The wood-tick is capable of carrying and transmitting several different pathogens to humans. Rocky Mountain spotted fever and Colorado tick fever are the diseases of concern in this area.

Spotted fever is an acute infection producing fever, joint and muscular pain and, sometimes, delirium, coma, convulsions, tremors, muscular rigidity and jaundice. There may be persistent effects and death can result. Adequate and prompt medical treatment alleviates distress. Fortunately, the incidence of spotted fever in Colorado is very low. The number of infected ticks is highest in western Montana and eastern Idaho.

Colorado tick fever is more prevalent. Luckily, it is a much less serious disease; in severity it may be likened to a case of influenza.

Ticks deserve respect, but they are certainly not to be feared if reasonable precautions are taken. Without question, the person spending long periods in tick country during the tick season should be immunized. Immunization is

recommended for anyone apt to be exposed to ticks. For those who only infrequently visit tick country and don't like "shots," for whatever reason, there are "horse-sense" precautions. Strip and have a tick hunt two or three times a day. Wear clothing of hard-surfaced material, rather than woolly material that gives the tick an easy foothold. Ticks are much easier to spot on light-colored clothing and they can be removed before taking hold of you. Stuff your trouser legs into your boots to foil easy access to your person.

The tick you find may be merely crawling around to see if it likes you. However, if it is attached, remember that it takes about two hours for it to dig in to the point of reaching your bloodstream. Only then can it introduce the pathogens responsible for spotted fever or tick fever *if* it carries these. To be sure, as any break in the skin opens a pathway for general infection, apply your favorite antiseptic following removal of the tick.

This raises the problem of removing the tick that has taken hold. Rough treatment will decapitate the "critter," leaving its head embedded, with the probability of general infection resulting. With *gentle* retraction it will often back out. Mild heat, as from the glowing tip of a cigarette, hastens the process; however, the emphasis is on *mild* — a cooked tick won't back out!

Reservations for guided tours of the Conservatory at Denver Botanic Gardens may be made by calling the Conservatory number, 297-2348, between 9:00 a.m. and 4:00 p.m. daily.

BYRON MIER

Retires From Washington Park Flower Garden

FRANCES NOVITT,
Landscape Architect

Denver Department of Parks and Recreation

THE Denver Department of Parks and Recreation has lost one of its most valuable members. Byron Mier, who since 1927, has spent most of his summers caring for the big flower garden in Washington Park, retired January 31, 1967. We will miss seeing him down in the big garden when summer comes, but we hope he will be enjoying some well-earned leisure.

Byron remembers the early days when the Washington Park crew went over to the greenhouse in City Park to get plant material by horse and wagon. In those days the garden was filled mostly with perennials and roses. Today it features annuals, and every summer it is so beautiful it can truly be said to be one of Denver's prominent tourist attractions. Byron's wisdom, interest and conscientious care of the big Flower Garden and the Martha Washington Garden at the south end of the park have helped to bring this about.

As the garden has grown in beauty and fame, people from all over the country have come to photograph it. Pictures of it are in innumerable private collections, and it appears in numerous commercial films. Many tourists and professional photographers return again and again to see the garden and visit with Byron. They often bring him copies of their pictures. He is surely one of the people directly responsible for Denver's reputation as a beautiful, friendly city.

Like his other co-workers, I have found my contacts with him most pleasant. He and his crew work with the flowers, each summer trying for better results than the year before, always trying to improve. All of us, Byron's gardener-"students," the tourists and his gardener friends, have come to know him as a very capable gardener, teacher and as a gentleman whose dignity, humility and tolerance are inspiring.

What are his plans for the future? Well, in addition to keeping in touch with his four children and 14 grandchildren, he hopes to take his new automobile trailer up into the mountains and to visit in depth the Rocky Mountain and western states. The Washington Park Flower Garden will be in charge of his capable former student, Salvador Castillo. We hope Byron will come and visit us to see how we are doing.



Byron Mier in Washington Park Flower Garden

HYBRID FLOWER Seed

Production in Colorado

GENE MILSTEIN

IN THE LAST ten years or so many new varieties of flower seeds have been introduced to the home gardener and many of these have been hybrids. In fact, hybrids have, in many cases, dominated the scene by pushing the original inbred varieties into the background, making some of them almost unobtainable. Petunias are probably the most striking example of this trend, and pansies, snapdragons and marigolds are others showing this tendency.

In Colorado, Charles Weddle has had a great part in hybrid flower seed production. He began plant breeding research on petunias some 20 years ago and has developed many of the best known hybrids. Over the years his company, Pan American Seed Company, Paonia, Colorado, has been the source of about 80% of the new hybrids on the market.

Mr. Weddle has recently transferred the activities of Pan American to another organization and built a new operation at Palisade near Grand Junction to begin intensive work on the production of reliable hybrid zinnia and chrysanthemum seed. Until now most chrysanthemums were available only as plants from commercial growers who started them from cuttings. The zinnias now on the market are almost all inbreds. So the effort to produce large quantities of F_1 hybrid seed in zinnias, chrysanthemums and other members of the Compositae family is relatively new.

The new facilities for this undertak-

ing consist mainly of greenhouses and include a special testing laboratory in which the climate can be controlled down to the exact desired temperature, humidity, light and amount of CO_2 in the air. In these facilities Mr. Weddle hopes to bring the "old" flowers back into the spotlight which others have had for the last five or ten years.

Exactly why some of the Compositae flowers have not received more attention and yielded more F_1 hybrids is an interesting question. Especially so, because some of them have been well known for many years. It is not because they lack the potential for producing good hybrids. On the contrary, considering the number of inbreds available and assuming they were crossed as was done with other flowers, the number of hybrids possible far exceeds even petunias. The answer seems to be that the Compositae flower heads are more complex than most others, physically (not genetically). How they differ from others and what kind of production problems result from these differences can be explained by comparing zinnias (Compositae) and petunias (Solanaceae).

Each petunia flower consists of one set of stamens and one stigma, while each zinnia flower is made up of hundreds of tiny flowers called florets. Each floret has one petal. These florets do not all mature at the same time on any given head. Usually, one circle of them opens up each day near the center of the flower. Consequently, it takes

from one to two weeks or more for a zinnia flower head to develop fully.

Therefore, if one desires a zinnia cross or hybrid, the stigma of each floret must be touched with pollen from another plant as it matures. To hybridize a petunia, one merely has to emasculate the pollen-laden stamens from the flower and touch the stigma with the desired pollen and results will become evident in two or three weeks. A seed pod will grow and mature where the flower was. This pod will contain from 150 to 200 tiny seeds.

Each zinnia floret, however, produces only one seed, thus necessitating much more work to produce the same amount of seed. Therefore, if it costs \$200 to \$300 to produce one ounce of petunia seed (about .01 per seed) the cost of zinnia seed by this type of hand pollination could be astronomical. There is also to consider the fact that the pollen belonging to the flower serving as the female parent must not be allowed to touch any stigma on that flower head or the desired cross will not be achieved. Clearly, the labor costs would be extremely high for producing large quantities of seed; besides, a few oversights would certainly contaminate the hybrids with inbreds.

In spite of these obstacles, there are already a few zinnia hybrids on the market for the home gardener but, in order to understand how they were produced, we must take a closer look at the physiology of the zinnia flower. It is very complex as nearly every Compositae flower head will prove to be made up of two different types of florets. One is called the ray floret and it has the colorful petal but is not bisexual as might be expected; it is female and the stigma is split at the end. The other kind is bisexual, has no petal and is called a disc floret. It is found in the central region of the flower head and a

mass of these appear as a brown ball with yellow fuzz on top. The stigmas and stamens are yellow and the sheaths around them are brown. Zinnias, as well as other members of the Compositae family, may have flower heads consisting of all ray florets or all disc florets or any degree between the two extremes. When there is only one ring of ray florets the flower is called single. If the flower head consists mostly of ray florets with only a few discs it is called double. The seeds of the two types of florets are easily distinguishable, but the plants they produce are identical. The disc flowers produce pollen and can self-pollinate, while the ray flowers must receive pollen from other florets to produce seed.

In the course of research, plant breeders have come across a mutant form of the flower which is all female (ray) and has no petals. When in "full bloom" the flower is a brown head with yellow stigmas all over it. This development somewhat simplified making the cross for a hybrid. All that was necessary was to cover the stigmas with pollen from another normal plant.

In spite of this discovery, the commercial production of zinnia hybrid seed is not really economical and that is why there are only three or four available. Undoubtedly new methods of pollination will be developed, and, when they are, we can expect a wide choice of new colors, plant foliage and more disease-resistant varieties. The problems discussed are somewhat the same with the other members of the Compositae family, and they give us an idea what men like Mr. Weddle are confronted with when they go from the simple to the more complex flowers. His success in this venture will mean many more beautiful choices for those of us who enjoy the world of flowers.

PLANT OF THE MONTH...

CHINESE HIBISCUS

Boettcher Conservatory

PEG HAYWARD

THROUGHOUT the world the hibiscus is known for its captivating beauty. Hibiscus is an important genus of over 200 species of herbs, shrubs and trees of the *Malvaceae* family. Many are ornamentals, some are useful for fibers, okra, roselle (used in making an acid drink and for jams, jellies, sauces and marmalades), wood, medicine, perfume and dye. The hibiscus is the outstanding flower of the South Seas and it was made the floral emblem of Hawaii in 1923 by joint resolution of the legislature.

Hibiscus rosa sinensis, rose of China, in many of its hybrid forms, may be seen blooming at the Boettcher Memorial Conservatory. *H. rosa-sinensis* is a shrub which attains a height of from three to eight feet when grown in a greenhouse, but grows much higher under subtropical conditions. Its alternate, shiny, broadly oval leaves are three to four inches long, tapered at the tips, and are unlobed but often toothed. The flowers are usually solitary in the upper leaf axils. The blossoms range in hue from yellow through various shades of red and usually have a deeper colored throat. They are about five inches in diameter. Hibiscus flowers have five flaring petals and five lobes to the calyx. The stigma is branched into five parts and is usually a bright crystalline red, like a bit of coral at the top of the central column. The prom-



inent stamens, which grow on the sides of the column, yellow it with their pollen.

Hibiscus plants bloom most of the year. Each blossom, however, remains fresh and lovely for the brief span of only one day whether left on the shrub, picked and placed in water or laid dry on a table top.

The generic name hibiscus is Virgil's name for mallow. A common name, shoeblack plant, is derived because of a black dye obtained from the flowers which is used by tropical bootblacks and also for dyeing hair.

The exquisite blossoms of the hibiscus will capture attention whether seen worn in the hair of Hawaiian women, tucked over the ear of Samoan men when they dance, formed into huge cascading bouquets, or seen by visitors to the Conservatory at Denver Botanic Gardens. Specimens in the Conservatory are numbered 130.

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Thyme

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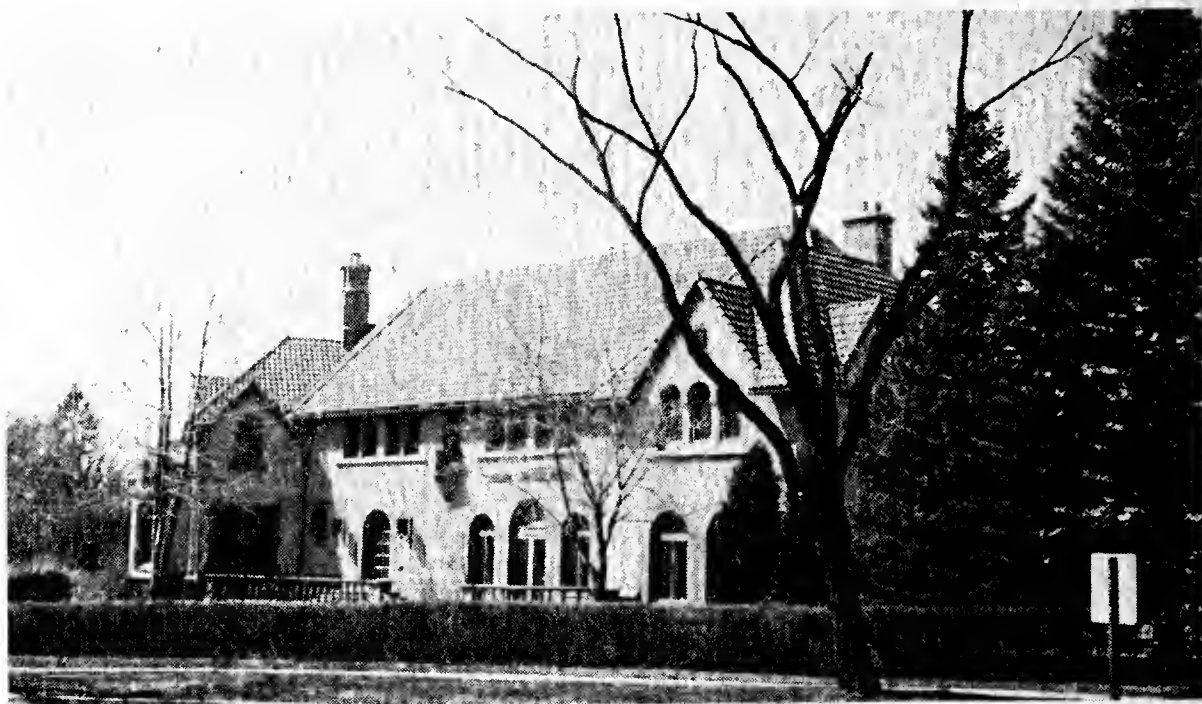
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This is a non-profit organization supported by municipal and private funds.

A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

MAY - JUNE 1967



THE COVER NATURE'S GIFT IN MAY — IRIS

THE GREEN THUMB

VOLUME TWENTY-FOUR, NUMBER THREE

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The Green Thumb

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ERRATA: Page 49, March-April issue. Title should be: Venturesome Adventives.
Page 53, 4th line from bottom should be: There are eight legs in contrast to insects which have six.

By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to the Membership Chairman, Mrs. William Stanley, 3800 East Long Road, Littleton, Colorado 80120 or call 771-3617.

AIS Region 20 Hosts



National Iris Meeting

CHARLES P. GORDON

(Mr. Gordon is Regional Vice President of Region 20)

DENVER WILL BE the gathering spot for hundreds of members of the American Iris Society as they convene May 31 for their Annual Meeting which will run through June 3. Hosts for this conclave will be the Society's Region 20.

Green Thumb readers may wonder what comprises the American Iris Society, and more specifically, what is Region 20 of AIS. The question is often asked and we will endeavor to give a full explanation.

The American Iris Society is a national organization, formed in 1920 and later incorporated as a non-profit institution in 1927. It exists for the sole purpose of promoting the culture and improvement of the iris. Control is vested in a Board of Directors elected by the membership.

In order to co-ordinate the activity of all the members of the AIS (who number about 7000) the United States has been divided into 24 sections called Regions. Of these the state of Colorado comprises Region 20. Each Region has its own governing body elected by members of the Region.

Region 20 has a membership of approximately 200. These members are not only very active in the Denver area, but are scattered throughout the state, from Limon to Grand Junction and from Craig to La Junta.

The activities of the Region are beneficial and of interest to the members. Two business and social dinner meetings are held each year — one in the spring and one in the fall. Garden tours are arranged at blooming time and training sessions for accredited iris judges are conducted.

Region 20 prides itself in the results of many of its activities in this area. Among these are developing and planting the iris gardens at Denver Botanic Gardens, City Park, Cranmer Park and along many of the Denver boulevards. Regional and National Iris Test Gardens have been set up, and twice within four years the Region has been chosen to host the national convention of the Society.

For you who are interested in the growing of iris from just a few in your garden, to hybridizing and culture, we extend a most cordial welcome to join our group. We are sure you will be as enthusiastic as we are. Single annual memberships are \$5.00 or a family membership for one year is only \$6.00.

Should you wish to become a member, please make check payable to: The American Iris Society, Region 20, and mail to Charles P. Gordon, Regional Vice President, 414 Eudora St., Denver 80220, or to any AIS member you know.

WELCOME ABOARD!



Dr. Ralph Adams, center, looks on as J. O. Riley, right, presents the American Iris Society's Distinguished Service Medal to Dr. Philip A. Loomis in his Colorado Springs home.

American Iris Society (AWARD)

COLORADO'S PIONEER iris hybridizer, Dr. Philip A. Loomis of Colorado Springs, has been awarded the Distinguished Service Medal of the American Iris Society.

Dr. Loomis, past ninety, still hybridizes iris and impatiently waits each year for blooming time to reveal what new form and color will show in the seedling beds at 1332 N. Walnut or at

his beautifully landscaped home garden at 1414 Culebra.

In 1944 Dr. Loomis was awarded the Hybridizer's Medal by the American Iris Society. This was followed in 1945 by the Dykes Medal, highest award in Irisdom, won by Elmohr, which is still among the 100 most popular varieties grown. In 1963, when the American Iris Society had its Annual Meeting in Colorado, Dr. Loomis was voted the President's Cup for his deep yellow iris, *Aspenglow*.

Again this year AIS members attending the Annual Meeting will make the trek to Colorado Springs to admire the beauty of Dr. Loomis' creations.

AIS Convention Guest GARDEN

J. O. RILEY

Mr. Riley has just completed a three-year term as vice-president of the American Iris Society's Region 20, which comprises the State of Colorado. He is again in charge of the Official Guest Garden — a post he filled with distinction in 1963 when the AIS last met in Denver.

PLANTINGS OF guest iris in a convention garden have become an increasingly attractive and important feature of the American Iris Society Annual Meetings during recent years. Our deep appreciation is again extended to Denver Botanic Gardens for furnishing facilities and space where all guest plants are located together in one plot. Uniform conditions for all plants will afford an opportunity to see the accomplishments of iris hybridizers and new varieties can be compared, evaluated and enjoyed.

For *The Green Thumb* readers who may be somewhat bewildered over "guest iris", let us explain that an invitation was sent to all AIS members in 1965 to submit to the Official Guest Garden iris they wished to have displayed this year at the Denver meeting. In 1966 iris were sent to Berkeley, California, for planting in the garden which will be the center of attraction for the 1968 meeting. This summer invitations will go out for guest iris to be planted in the guest garden for the 1969 meeting which will be held in Milwaukee, Wisconsin.

The iris planted in the Official Guest Gardens remain the property of the grower or hybridizer and, after the Annual Meeting is finished, all iris are returned to the owner. Digging, clean-

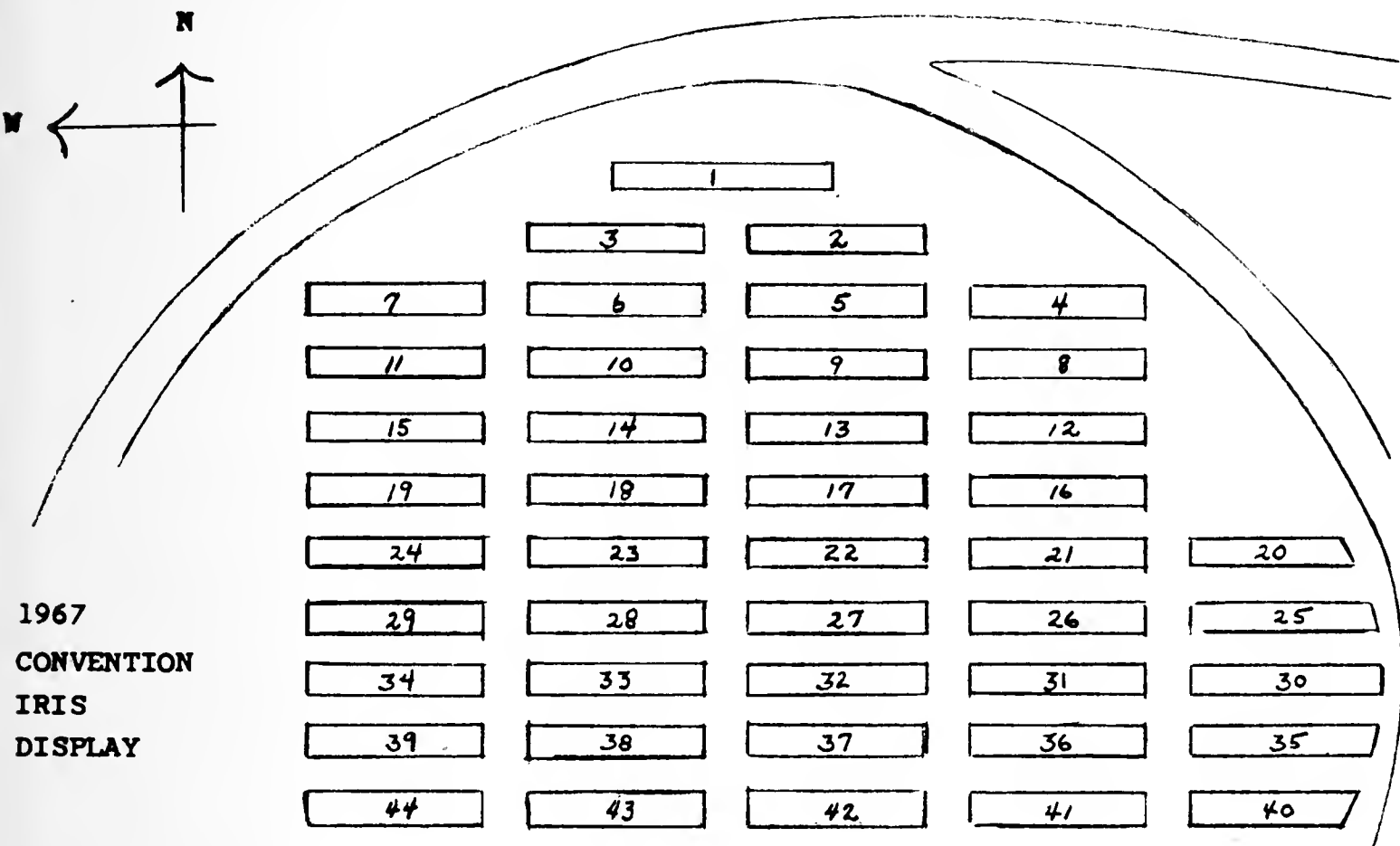
ing and packing the iris in the guest garden is a tremendous task, for the individual iris which was planted as a single rhizome two years ago has, in most cases, grown to be a sizable clump.

Statistics do not always make the most interesting reading, but the following items might be of interest. In the Official Guest Garden we have 1,008 separate and distinct irises, which were sent to us by 151 hybridizers who live in 29 different states. It is also interesting to note that, of the total number of iris, only 506 varieties are named; the other 502 varieties are being shown under seedling number. This is occasioned by the fact that many hybridizers feel it is desirable to place their seedlings in the Official Guest Gardens so that they may be seen by a large section of the membership of the society. The Official Guest Garden thus serves in a dual capacity for, in addition to providing a show place for newly named varieties and seedlings, it affords the society membership an opportunity to see the greatest possible number of new varieties at one time. While the exact figures are not available, it might be stated that a large number of the named varieties listed here were sent to us under seedling number.

In addition to the Official Guest Garden located in Denver Botanic Gardens, supplemental displays of guest iris are located at Long's Iris Gardens in Boulder; in the gardens of Dr. R. W. Adams, Dr. James H. Brown and Dr. Philip A. Loomis in Colorado Springs and on the campus in the testing grounds of Colorado State University at Fort Collins. The gardens at Fort Collins are under the supervi-

sion of Mr. Carl Jorgensen, Associate Professor in Horticulture. Hybridizers were requested to send as many as three rhizomes of their iris and, whenever this was done, the additional rhizomes were placed in the supplemental guest gardens.

The detailed list of the iris planting in the beds at Denver Botanic Gardens, with a numbered map, follows:



1967
CONVENTION
IRIS
DISPLAY

- BED NO. 1**
North Row — from East to West
- ORGAN MUSIC Noyd's Iris Garden, Wash.
 - SWEET LILANI Noyd's Iris Garden, Wash.
 - OVER DUE Noyd's Iris Garden, Wash.
 - MAGICOLOR Noyd's Iris Garden, Wash.
 - DEBBY RAIDON Kuntz, Wash.
 - GLITTER GLOW Noyd's Iris Garden, Wash.
 - ROSES IN SNOW Noyd's Iris Garden, Wash.
 - LACY SURPRISE Noyd's Iris Garden, Wash.
 - YES SIR Noyd's Iris Garden, Wash.
 - LACE GALORE Noyd's Iris Garden, Wash.
 - QUIET CHARM Noyd's Iris Garden, Wash.
 - LACED GOLD Noyd's Iris Garden, Wash.
 - GYPSY SENORITA Noyd's Iris Garden, Wash.
 - BLUSHING BEAUTY Noyd's Iris Garden, Wash.
 - FLUTED GLORY Noyd's Iris Garden, Wash.

- BED NO. 1**
South Row — from East to West
- CORDUROY AND LACE Noyd's Iris Garden, Wash.
 - FLUTED LIME Noyd's Iris Garden, Wash.
 - SDLG. 58-20-6 Hoage, Wash.
 - SDLG. 58-20-7 Hoage, Wash.
 - SDLG. 58-20-8 Hoage, Wash.
 - SDLG. 61-23 Hoage, Wash.
 - SDLG. 6-5 Hoage, Wash.
 - MT. REPOSE E. & A. Watkins, N. H.
 - BROTHER ED E. & A. Watkins, N. H.
 - LAND OF PROMISE E. & A. Watkins, N. H.

- SDLG. 57-47-a E. & A. Watkins, N. H.
- GEO. FOWLER E. & A. Watkins, N. H.
- SDLG. 61-30-a E. & A. Watkins, N. H.
- DOROTHY LEAVITT E. & A. Watkins, N. H.
- BARBARA BURT E. & A. Watkins, N. H.

- BED NO. 2**
North Row — from East to West
- SCATTERED SHOWERS F. Foster, Colo.
 - SDLG. 56-168 Tell's Iris Garden, Utah
 - SDLG. H 65-6 Heacock, Colo.
 - SDLG. 62-21-X Sheaff, Ill.
 - LITTLE LYNN Sheaff, Ill.
 - SDLG. 62-21-Y Sheaff, Ill.
 - SDLG. 63-4-A Sheaff, Ill.
 - BORDER BELLE A. Brown, Wash.
 - BROWN RINGS A. Brown, Wash.
 - BORDER FRILLS A. Brown, Wash.
 - BORDER ROSE A. Brown, Wash.
 - ARCTIC BLUE A. Brown, Wash.

- BED NO. 2**
South Row — from East to West
- ARCTIC DREAM A. Brown, Wash.
 - ARCTIC FANCY A. Brown, Wash.
 - ARCTIC MYSTERY A. Brown, Wash.
 - ARCTIC KISS A. Brown, Wash.
 - FLAME SPOT A. Brown, Wash.
 - ARCTIC MIST A. Brown, Wash.
 - GREEN FROST A. Brown, Wash.
 - ARCTIC ROSE A. Brown, Wash.

SUNNY HEART A. Brown, Wash.
 ARCTIC WINE A. Brown, Wash.
 ARCTIC BEACON A. Brown, Wash.
 GREEN MAGIC A. Brown, Wash.

BED NO. 3

North Row — from East to West

DARK EDEN A. Brown, Wash.
 PINK PRIDE A. Brown, Wash.
 BRONZE BABE A. Brown, Wash.
 PLUM DANDY A. Brown, Wash.
 SPRING FAIRY A. Brown, Wash.
 BLY COX Ensminger, Nebr.
 SDLG. 59-14 Rabe, Ky.
 SDLG. EM-38 E. Minnick, Mo.
 SDLG. 60-51-1 C. R. Minnick, Mo.
 SDLG. M-13 C. R. Minnick, Mo.
 SDLG. 61-217 C. R. Minnick, Mo.
 ROYAL RANSOM Palmer, Mo.

BED NO. 3

South Row — from East to West

JULIE MARIE Peterson, Utah
 SDLG. LP-65-15 Peterson, Utah
 PINK PETITE Judy, Wash.
 BROWN FLARE Judy, Wash.
 PINKETTE Vallette, Idaho
 SKY CAP Vallette, Idaho
 BORDER QUEEN Vallette, Idaho
 SDLG. H 65-2 Heacock, Colo.
 SDLG. H 65-9 Heacock, Colo.
 VIBRANT CHARM Noyd's Iris Garden, Wash.
 NATIVE DAUGHTER Noyd's Iris Garden, Wash.
 MISS RUFFLES Wright, Minn.

BED NO. 4

North Row — from East to West

SDLG. F-6223-1 Batson, Ala.
 SDLG. 0-65-2 Batson, Ala.
 SDLG. 0-64-1 Batson, Ala.
 SDLG. 0-65-4 Batson, Ala.
 SDLG. F-30-1 Batson, Ala.
 SDLG. 59-2A Fraser, Ala.
 GLACIER GIRL Batson, Ala.
 SDLG. 59-9B Fraser, Ala.
 SDLG. GB 59-4 Hatfield, W. Va.
 PENSIVE MOOD Fraser, Ala.
 CASCO BAY W. Rogers, N.J.
 RASPBERRY PARFAIT McCaughey, Okla.

BED NO. 4

South Row — from East to West

SDLG. 51286 Kuessel, N. Y.
 WHITE HARMONY Kuessel, N. Y.
 SDLG. 5376 Kuessel, N. Y.
 JESSIE VIETTE Viette Nurseries, N. Y.
 BROOKVILLE Kuessel, N. Y.
 SDLG. 51162-3 Kuessel, N. Y.
 WINGROVE C. E. Smith, Calif.
 TELLEN C. E. Smith, Calif.
 SDLG. 4-61 C. E. Smith, Calif.
 SDLG. 5-61 C. E. Smith, Calif.
 SDLG. 6-61 C. E. Smith, Calif.
 SDLG. 7-61 C. E. Smith, Calif.

BED NO. 5

North Row — from East to West

SDLG. G 65-1 Gordon, Colo.
 SDLG. G 63-18 Gordon, Colo.
 SDLG. G 65-8 Gordon, Colo.
 SDLG. G 65-10 Gordon, Colo.
 SDLG. G 61-6 Gordon, Colo.
 SDLG. G 66-5 Gordon, Colo.
 SDLG. G 65-12 Gordon, Colo.
 SDLG. 61-E-1-S Elkins, Mo.
 LASATA Hinkle, III.
 SOUTHERN COMFORT Hinkle, III.
 DAISY POWELL Hinkle, III.
 VILLAGE GREEN Hinkle, III.

BED NO. 5

South Row — from East to West

FOREIGN AFFAIR Nelson, Idaho
 MODERN TREND Nelson, Idaho
 ALASKAN CROWN Nelson, Idaho
 GAILY CLAD Nelson, Idaho
 TORCH BEARER Nelson, Idaho
 SMART SET Nelson, Idaho
 WESTERN WELCOME Nelson, Idaho
 DEAR BOB Hinkle, III.

LEDA KNIGHT Hinkle, III.
 EVE Hinkle, III.
 BRAVE VIKING Hinkle, III.
 MARSHMALLOW Olson, Mo.

BED NO. 6

North Row — from East to West

SDLG. GB 59-5 Hatfield, W. Va.
 SDLG. E-1 Batson, Ala.
 SDLG. 59-10A Fraser, Ala.
 CUB SCOUT Plough, Wash.
 SMOKE SCREEN Plough, Wash.
 WHITE DOT H. & D. Wall, Kan.
 WIZARD Ghio, Calif.
 SDLG. 65-4 Martin, Colo.
 ORANGE PARADE Hamblen, Utah
 SDLG. 59-76 Maxim, Calif.
 BROWNIE SCOUT Gaulter, Calif.
 SDLG. H 59-73 Hamblen, Utah

BED NO. 6

South Row — from East to West

SDLG. 63-60 Buckles, Mo.
 SDLG. 20-06 Schaefer, III.
 NIGHT TRAIN Varner, III.
 SDLG. 16-06 Schaefer, III.
 SANDY JEAN Bakke-Messer, Minn.
 ELLEN Q. Peck, N. Y.
 CARNIVAL GLASS Jones, Ore.
 CRYSTAL BAY Jones, Ore.
 GLACIER BAY Jones, Ore.
 SDLG. H 64-5 Heacock, Colo.
 SDLG. H 64-12 Heacock, Colo.
 SDLG. H 65-1 Heacock, Colo.

BED NO. 7

North Row — from East to West

HONOR GUARD Olson, Mo.
 GOLD CITATION Olson, Mo.
 SDLG. 65-20A Olson, Mo.
 BLUE ACCENT Olson, Mo.
 RUFFLED ROYALTY Olson, Mo.
 SDLG. 65-17A Olson, Mo.
 SDLG. 65-39 Olson, Mo.
 SDLG. 61-15A Olson, Mo.
 SDLG. 61-16A Olson, Mo.
 SDLG. 62-5 Olson, Mo.
 SDLG. 63-13 Olson, Mo.
 SDLG. 63-8 Olson, Mo.

BED NO. 7

South Row — from East to West

SDLG. 63-17 Olson, Mo.
 SDLG. 63-29A Olson, Mo.
 SDLG. 65-25A Olson, Mo.
 SDLG. 60-40 Pilley, Calif.
 CHERRY MALLOT Plough, Wash.
 COCKTAIL TIME Plough, Wash.
 CONGO QUEEN Christensen, Wash.
 DARK VALLEY Christensen, Wash.
 GREEN ILLUSION Jennings, N. Y.
 JAIPUR Plough, Wash.
 LIKE MAGIC Carlson, Wash.
 MONSOON Plough, Wash.

BED NO. 8

North Row — from East to West

HARLAN Hinkle, III.
 VIKING SPIRIT Carlson, Wash.
 WINTRY NIGHT Pond, Wash.
 SDLG. S-1 C. Smith, Colo.
 DIPLOMACY Keppel, Calif.
 GRINGO Keppel, Calif.
 NINEVEH Keppel, Calif.
 BABBLING BROOK Keppel, Calif.
 MANSION HOUSE H. & D. Wall, Kan.
 PERSUASIVE DAWN H. & D. Wall, Kan.
 SDLG. 60-38 H. & D. Wall, Kan.
 SDLG. 59-I-E H. & D. Wall, Kan.

BED NO. 8

South Row — from East to West

SDLG. 62-21 W H. & D. Wall, Kan.
 SDLG. 62-59 B H. & D. Wall, Kan.
 SDLG. 56-94 H. & D. Wall, Kan.
 SDLG. 63-85 A H. & D. Wall, Kan.
 SDLG. 61-31 B H. & D. Wall, Kan.
 BIG JOHN Schmelzer's Garden, Wash.
 ETERNAL YOUTH Schmelzer's Garden, Wash.
 FIRST SNOWFLAKE Schmelzer's Garden, Wash.

NYLON LACESchmelzer's Garden, Wash.
 PROUD BEAUTYSchmelzer's Garden, Wash.
 WIDE COUNTRYSchmelzer's Garden, Wash.
 SDLG. 62-146ZGhio, Calif.

BED NO. 9

North Row — from East to West

SDLG. 62-193-2Ghio, Calif.
 SDLG. 61-89WGhio, Calif.
 MYSTIC MOODGhio, Calif.
 SDLG. 63-116RGhio, Calif.
 SDLG. 62-171XGhio, Calif.
 MAHALOGhio, Calif.
 SDLG. 62-33AGhio, Calif.
 FOREST MOONGhio, Calif.
 ROYAL TARAGhio, Calif.
 MOUNT EDENGhio, Calif.
 OASISGhio, Calif.
 NINA'S DELIGHTGhio, Calif.

BED NO. 9

South Row — from East to West

MEADOW MISTGhio, Calif.
 MAUVE MAGICC. & E. Smith, Idaho
 SDLG. 64-107C. & E. Smith, Idaho
 AUTUMN SUNC. & E. Smith, Idaho
 CARMEL KISSESC. & E. Smith, Idaho
 DREAM MAIDENC. & E. Smith, Idaho
 SDLG. 61-845C. & E. Smith, Idaho
 IVORY GOWNC. & E. Smith, Idaho
 LAURA'S CHOICEC. & E. Smith, Idaho
 SMOKY MOUNTAINC. & E. Smith, Idaho
 SDLG. 64-346C. & E. Smith, Idaho
 DIVINE MELODYC. & E. Smith, Idaho

BED NO. 10

North Row — from East to West

SDLG. 64-348C. & E. Smith, Idaho
 SDLG. 64-23Knopf Iris Garden, Calif.
 SDLG. 64-63Knopf Iris Garden, Calif.
 SDLG. 64-14Knopf Iris Garden, Calif.
 ERIKAKnopf Iris Garden, Calif.
 SDLG. 64-36Knopf Iris Garden, Calif.
 SDLG. 64-32Knopf Iris Garden, Calif.
 WHITE KINGKnopf Iris Garden, Calif.
 DENVER MINTKnopf Iris Garden, Calif.
 EXECUTIVEKnopf Iris Garden, Calif.
 CRAFTSMANKnopf Iris Garden, Calif.
 SDLG. M-7-65Mick & Son, Kan.

BED NO. 10

South Row — from East to West

SDLG. M-24-63Mick & Son, Kan.
 SDLG. M-12-62Mick & Son, Kan.
 SDLG. M-34-63Mick & Son, Kan.
 SDLG. DM-14-63Mick & Son, Kan.
 LORNA LEEGibson Iris Garden, Calif.
 MAD MAIDGibson Iris Garden, Calif.
 RADIANT APOGEEGibson Iris Garden, Calif.
 WILD APACHEGibson Iris Garden, Calif.
 GAY TRACERYGibson Iris Garden, Calif.
 VILLA GOLDGibson Iris Garden, Calif.
 PURPLE VILLAGibson Iris Garden, Calif.
 GOLDEN FILIGREEGibson Iris Garden, Calif.

BED NO. 11

North Row — from East to West

BLUE MYSTIQUEFail, Calif.
 SDLG. H 3-3Fail, Calif.
 ROSE REPRISEFail, Calif.
 SDLG. H 4-1Fail, Calif.
 WHITE FLUTTERFail, Calif.
 SDLG. K-2Fail, Calif.
 SDLG. MM-X-BH #4Parker, Ky.
 TERRY'S CHOICEParker, Ky.
 SDLG. K-X-SsParker, Ky.
 LINGERING MEMORIESRentfro, Mo.
 SDLG. 61-7Maxim, Calif.
 SDLG. 62-10Maxim, Calif.

BED NO. 11

South Row — from East to West

KIMMIE LYNNEFreidline, Kan.
 PICKWICK GREENJolly, Ala.
 SDLG. J 60-24Jolly, Ala.
 SDLG. J 65-3BBJolly, Ala.
 SDLG. J 65-23Jolly, Ala.
 SDLG. 65-33Jolly, Ala.
 SDLG. 65-71YJolly, Ala.

SDLG. 65-1Martin, Colo.
 SDLG. 65-3Martin, Colo.
 SDLG. B 3-62M. Brizendine, Kan.
 SAPPHIRAMACochran, Okla.
 RYE WHISKEYMullen, Nebr.

BED NO. 12

North Row — from East to West

DESEREEMiller, Wisc.
 SDLG. 62-K-EMiller, Wisc.
 SDLG. 63-OEMiller, Wisc.
 SDLG. 63-1-KMiller, Wisc.
 SDLG. 65-12-MMiller, Wisc.
 SDLG. 63-02Miller, Wisc.
 SDLG. 64-20-MMiller, Wisc.
 FLUTED PEARLMiller, Wisc.
 SDLG. B3AEvans, Calif.
 SDLG. T17Evans, Calif.
 SDLG. A8AEvans, Calif.
 SDLG. 220CEvans, Calif.

BED NO. 12

South Row — from East to West

SDLG. B1AEvans, Calif.
 SNOWSCAPEEvans, Calif.
 SDLG. MA1Evans, Calif.
 SIBONEYEvans, Calif.
 SDLG. M83AEvans, Calif.
 SDLG. M63Evans, Calif.
 CAROLANDSCorlew, Calif.
 SIGNATURECorlew, Calif.
 COUNTY FAIRCorlew, Calif.
 RIO ROSOCorlew, Calif.
 SILVER SKIESCorlew, Calif.
 WISHING HOURCorlew, Calif.

BED NO. 13

North Row — from East to West

CHRISTIE ANNEGaulter, Calif.
 PORT ROYALGaulter, Calif.
 MAY MELODYHamblen, Utah
 JILBYGaulter, Calif.
 LILAC CHAMPAGNEHamblen, Utah
 NIGHT SONGLuihn, Calif.
 LAURIEGaulter, Calif.
 COUNTRY SQUIREGaulter, Calif.
 ROYAL GOLDHamblen, Utah
 SDLG. 62-62CHamblen, Utah
 GOLDEN CHORDHamblen, Utah
 BACCARATGaulter, Calif.

BED NO. 13

South Row — from East to West

HIGH SIERRAGaulter, Calif.
 SDLG. G 63-100Gaulter, Calif.
 SDLG. H 60-152Hamblen, Utah
 SDLG. 63-1G. Rogers, Texas
 SDLG. H 61-109Hamblen, Utah
 SDLG. H 61-83Hamblen, Utah
 HEATHER HALOHamblen, Utah
 CHARMING CO-EDGaskill, Ill.
 MIDWEST MORNINGGaskill, Ill.
 SDLG. 1664-25Gaskill, Ill.
 SDLG. G 66-3Gordon, Colo.
 JAMAICA RUMRiley, Colo.

BED NO. 14

North Row — from East to West

SDLG. 5264Varner, Ill.
 SDLG. 5100Varner, Ill.
 SDLG. 6130Varner, Ill.
 SDLG. 5277Varner, Ill.
 SDLG. 5458Varner, Ill.
 SDLG. 489Varner, Ill.
 SDLG. 5971Varner, Ill.
 MISS ILLINIVarner, Ill.
 PURPLE HEARTVarner, Ill.
 SDLG. 6084Varner, Ill.
 AVISVarner, Ill.
 MONTICELLOVarner, Ill.

BED NO. 14

South Row — from East to West

BILL NORMANVarner, Ill.
 LEORA KATEBuckles, Mo.
 JUNA KAYBuckles, Mo.
 SDLG. 63-21Buckles, Mo.
 DEBRA JEANBuckles, Mo.
 SDLG. 62-P-1Buckles, Mo.

JANICE RUTH Buckles, Mo.
 SDLG. 64-22 Buckles, Mo.
 SDLG. 64-03 MacKendrick, Colo.
 SDLG. H 65-1 Hurlburt, Colo.
 SDLG. H 65-2 Hurlburt, Colo.
 PRINCESS GRETA Bakke-Messer, Minn.

BED NO. 15

North Row — from East to West

AQUATENNIAL QUEEN Hartkopf, Minn.
 MINNESOTA SKIES Hartkopf, Minn.
 SIOUX MAIDEN Rudser, Minn.
 SDLG. RF-65-1 Foss Iris Garden, Minn.
 SDLG. D 112 K Peck, N. Y.
 HEIDI Peck, N. Y.
 SDLG. D 113 K Peck, N. Y.
 SWISS MISS Peck, N. Y.
 DEEP GULF Peck, N. Y.
 SDLG. 60-179-1 Rowe, Jr., Iowa
 SDLG. 60-40-1 Rowe, Jr., Iowa
 SDLG. 60-154-1 Rowe, Jr., Iowa

BED NO. 15

South Row — from East to West

WATER MUSIC Jones, Ore.
 SDLG. 712-4 Jones, Ore.
 SDLG. 730-1 Jones, Ore.
 LEMON TREE Jones, Ore.
 FANFARE ORCHID Jones, Ore.
 MAY DANCER Shoop, Ore.
 OLE Shoop, Ore.
 SDLG. 59-6 Shoop, Ore.
 SDLG. 62-5-6 Shoop, Ore.
 HELLO DOLLY Baker, Colo.
 LIGHT OF LOVE Baker, Colo.
 WILDCAT Baker, Colo.

BED NO. 16

North Row — from East to West

PIKES PEAK F. Foster, Colo.
 COLORADO NIGHT F. Foster, Colo.
 COLORADO MELODY F. Foster, Colo.
 SDLG. A-30-65 F. Foster, Colo.
 SDLG. A-31-65 F. Foster, Colo.
 SDLG. A-32-65 F. Foster, Colo.
 SDLG. A-33-65 F. Foster, Colo.
 SDLG. A-34-65 F. Foster, Colo.
 SDLG. A-35-65 F. Foster, Colo.
 SDLG. A-24-65 F. Foster, Colo.
 SDLG. A-27-65 F. Foster, Colo.
 SDLG. A-26-65 F. Foster, Colo.

BED NO. 16

South Row — from East to West

SWEET FOREVER Baker, Colo.
 SDLG. 62-78 Baker, Colo.
 MOHAWK TRAIL Markham, Mass.
 SDLG. M61-15A Markham-Provost, Mass.
 ROBT. SMITHWOOD Sheaff, Ill.
 CAMELIA Sheaff, Ill.
 SUNRISE SERENADE Sheaff, Ill.
 PINK FLURRY Sheaff, Ill.
 SDLG. 62-14-B Sheaff, Ill.
 SDLG. 62-22-B Sheaff, Ill.
 SDLG. 63-35-A Sheaff, Ill.
 WHITE DRAPES Wallace, Utah

BED NO. 17

North Row — from East to West

ORANGE VISTA Mayberry, Utah
 EL GRANDE AZUL Tolman, Utah
 SUITER'S GOLD Suiter, Idaho
 NORTHERN AIRE Goodrick, Wisc.
 LIME SHADOWS Hooker, Ill.
 SDLG. 4A Tells Iris Garden, Utah
 MARGARET ZURBRIGG Zurbrigg, Va.
 BLISS Zurbrigg, Va.
 BEATRICE JOYNT Zurbrigg, Va.
 SDLG. 59-20 Zurbrigg, Va.
 HIDDEN CHARM Schirmer, Mo.
 BREATHLESS Schirmer, Mo.

ROW NO. 17

South Row — from East to West

HIGH FLIER Schirmer, Mo.
 PEACEFUL Schirmer, Mo.
 TRULY GRAND Schirmer, Mo.
 SDLG. 21K Schirmer, Mo.
 SDLG. 131 T Schirmer, Mo.

SDLG. 64 K Schirmer, Mo.
 SDLG. 80 E Schirmer, Mo.
 GOLDEN OPPORTUNITY Bledsoe, Tenn.
 MONTE SANO Bledsoe, Tenn.
 OLIVE LANGDON Bledsoe, Tenn.
 ROSA BLEDSOE Bledsoe, Tenn.
 (vacant)

BED NO. 18

North Row — from East to West

CORAL ELEGANCE Bledsoe, Tenn.
 SDLG. 64-1 Tallant, Okla.
 SDLG. 65-3 Tallant, Okla.
 SDLG. 65-49 Tallant, Okla.
 SDLG. 65-23 Tallant, Okla.
 SDLG. 61-1 Ross, Okla.
 MARY STAR Ross, Okla.
 SDLG. 61-3 Ross, Okla.
 SDLG. 61-4 Ross, Okla.
 SDLG. 61-5 Ross, Okla.
 SDLG. 61-6 Ross, Okla.
 SDLG. 61-7 Ross, Okla.

BED NO. 18

South Row — from East to West

DAWN DESIRE Ross, Okla.
 IRRIDESCENT CHARM Ross, Okla.
 KEVIN Luke, Idaho
 SDLG. 3-63 Luke, Idaho
 MISS PRIM Luke, Idaho
 MARY EOLA Luke, Idaho
 EXTACY Luke, Idaho
 SDLG. B-63 Luke, Idaho
 OYSTER BAY Luke, Idaho
 SDLG. G-1 Gilmer, Va.
 SDLG. G-2 Gilmer, Va.
 ABOVE ALL Gordon, Colo.

BED NO. 19

North Row — from East to West

FORMAL FASHION Terrell, Calif.
 CELESTIAL SWAN Terrell, Calif.
 HEART OF NIGHT Terrell, Calif.
 AD ASTRA Babson, Calif.
 CREDO Babson, Calif.
 EMMA HERRON DuBose, Calif.
 EPIC Babson, Calif.
 TATOO Babson, Calif.
 CONFECTION Babson, Calif.
 SECRET AGENT DuBose, Calif.
 CHARADE Babson, Calif.
 APROPOS Babson, Calif.

BED NO. 19

South Row — from East to West

PERNILLA Hagberg, Ill.
 BUTTERSCOTCH RIPPLE Hagberg, Ill.
 NITTANY Hunter, Penn.
 SDLG. K-35 Knocke, N. J.
 SDLG. K-52 Knocke, N. J.
 SDLG. K-59 Knocke, N. J.
 CROSS COUNTRY Knocke, N. J.
 SKYDIVA Knocke, N. J.
 SDLG. 329-63-A Carrington, Calif.
 SDLG. 418-63-C Carrington, Calif.
 SDLG. 437-63-A Carrington, Calif.
 SDLG. 440-10-7 Carrington, Calif.

BED NO. 20

North Row — from East to West

BILLOWING SAILS Palmer, Mo.
 SDLG. 6362 A Palmer, Mo.
 SOPHISTICATE Palmer, Mo.
 SDLG. 13563 A Palmer, Mo.
 SDLG. 13665 A Palmer, Mo.
 BLUE 7563 A Palmer, Mo.
 BLUE NOTE Palmer, Mo.
 SDLG. 2062 A Palmer, Mo.
 SDLG. 5565 G Palmer, Mo.
 SDLG. 2865 A Palmer, Mo.
 SUNSWEPT Palmer, Mo.

BED NO. 20

South Row — from East to West

LILTING MELODY Palmer, Mo.
 GOLDEN SNOW Palmer, Mo.
 SDLG. 3965 D Palmer, Mo.
 WHITE FINERY Palmer, Mo.
 SDLG. 2665 B Palmer, Mo.
 SDLG. 9965 A Palmer, Mo.

SDLG. 5565 C	Palmer, Mo.
CAPTIVE CLOUD	Palmer, Mo.
SDLG. 13065 B	Palmer, Mo.
SDLG. 4565 A	Palmer, Mo.
SDLG. 5565 J	Palmer, Mo.

BED NO. 21

North Row — from East to West

SDLG. 13465 A	Palmer, Mo.
SDLG. 5565 A	Palmer, Mo.
SDLG. 1362 C	Palmer, Mo.
SDLG. 8761 B	Palmer, Mo.
SDLG. 5762 E	Palmer, Mo.
SDLG. 7265 A	Palmer, Mo.
SDLG. 6463 A	Palmer, Mo.
SDLG. 965 B	Palmer, Mo.
SDLG. 8465 A	Palmer, Mo.
SDLG. 11965 B	Palmer, Mo.
SDLG. 4965 A	Palmer, Mo.
SDLG. 9465 A	Palmer, Mo.

BED NO. 21

South Row — from East to West

WINTER PAGEANT	Palmer, Mo.
SDLG. 11765 D	Palmer, Mo.
SDLG. 6565 A	Palmer, Mo.
SDLG. 64-5	Benson, Mo.
DASHING PRINCE	Benson, Mo.
AIR DEBALLE	Benson, Mo.
COURTSHIP	Benson, Mo.
SDLG. 63-15	Benson, Mo.
TWENTY FATHOMS	Benson, Mo.
SDLG. 62 242-B	Johnson, Colo.
ORANGE PARADE	Hamblen, Utah
SDLG. 62-242-C	Johnson, Colo.

BED NO. 22

North Row — from East to West

SDLG. D 65-10	Durrance, Colo.
SDLG. D 61-8	Durrance, Colo.
SDLG. D 65-3	Durrance, Colo.
SDLG. D 61-90	Durrance, Colo.
SDLG. D 63-1	Durrance, Colo.
SDLG. D 65-11	Durrance, Colo.
SDLG. D 63-7	Durrance, Colo.
SDLG. D 63-5	Durrance, Colo.
SDLG. D 60-2	Durrance, Colo.
SDLG. D 63-6	Durrance, Colo.
SDLG. D 65-20	Durrance, Colo.
SDLG. D 59-77	Durrance, Colo.

BED NO. 22

South Row — from East to West

SDLG. 62-57 B	Blodgett Iris Garden, Wisc.
APOLLO'S GIFT	Blodgett Iris Garden, Wisc.
MIGHTY "MO"	Roderick, Mo.
DISCOTHEQUE	Hohn, N. Y.
RINGMASTER	Reinhardt's Iris Garden, Wisc.
SDLG. 63-45	Reinhardt's Iris Garden, Wisc.
VIRGIE	Ensminger, Nebr.
SDLG. 58-21-1	Dubes-Young, Calif.
SDLG. 58-21-2	Dubes-Young, Calif.
SDLG. 60-84-2	Dubes-Young, Calif.
SDLG. 6227	Branch, Ill.
SDLG. 66-63	Wills, Tenn.

BED NO. 23

North Row — from East to West

ROSE KINGDOM	Wills, Tenn.
WESTERN STAR	Wills, Tenn.
PORTO BELLO	Wills, Tenn.
SDLG. 32-63	Wills, Tenn.
FIREDRAKE	Wills, Tenn.
SDLG. 33-63	Wills, Tenn.
NATCHEZ TRACE	Wills, Tenn.
SDLG. 1-62	Wills, Tenn.
ROUND DANCE	Wills, Tenn.
SDLG. A8-3	Harper, Mo.
SDLG. B4-7	Harper, Mo.
GINGHAM GOWN	Harper, Mo.

BED NO. 23

South Row — from East to West

TEXAS STAR	Harper, Mo.
SDLG. 4691	Hooker, Ill.
SDLG. 4531	Hooker, Ill.
SDLG. 4671	Hooker, Ill.
CITY OF PORTERVILLE	Schortman's Iris Garden, Calif.
FLUTED GOLD	Schortman's Iris Garden, Calif.

APRIL CLOUDS	Schortman's Iris Garden, Calif.
ECHO ONE	Schortman's Iris Garden, Calif.
CORA LEE WHITE	White, Texas
SDLG. GR-9	Edelman, Colo.
SDLG. BP-1	Edelman, Colo.
SDLG. CS-1	Edelman, Colo.

BED NO. 24

North Row — from East to West

SYLVIA RIGGS	Riggs, Mich.
SARDAR	Riggs, Mich.
HARRIETT LEWIS	Riggs, Mich.
PURPLE SHEEN	Riggs, Mich.
SDLG. W-54-C	D. Weber, Colo.
SDLG. R-26-A	Ryden, Colo.
SDLG. W 92-A	D. Weber, Colo.
SDLG. W 92-C	D. Weber, Colo.
SDLG. 61-35-3	R. Brown, Wash.
CORAL COMMENTS	R. Brown, Wash.
BLUE OLYMPICS	R. Brown, Wash.
SILVER WEDDING	R. Brown, Wash.

BED NO. 24

South Row — from East to West

SEAFAIR BALLET	R. Brown, Wash.
EXOTIC BUFF	R. Brown, Wash.
SMILING QUEEN	R. Brown, Wash.
ARIZONA SUNSET	R. Brown, Wash.
CELESTIAL ORCHID	R. Brown, Wash.
CHOCOLATE MALT	R. Brown, Wash.
HEAVENLY PINK	R. Brown, Wash.
MOHR DELIGHT	R. Brown, Wash.
IVORY LACE	R. Brown, Wash.
SEAFAIR PIRATE	R. Brown, Wash.
MASTER RICHARD	Berndt, Mich.
SDLG. 74B2	Berndt, Mich.

BED NO. 25

North Row — from East to West

GYPSY JEWELS	Schreiner's Gardens, Ore.
SPARKLING SEAS	Stevens, New Zealand
POMPAÑO PEACH	Schreiner's Gardens, Ore.
STEPPING OUT	Schreiner's Gardens, Ore.
SUNNY SPLENDOR	Schreiner's Gardens, Ore.
BLUE MOUNTAINS	Schreiner's Gardens, Ore.
ROYAL TAPESTRY	Schreiner's Gardens, Ore.
PRINCE INDIGO	Schreiner's Gardens, Ore.
SUTTER'S FALLS	Schreiner's Gardens, Ore.
CRYSTAL BLUE	Schreiner's Gardens, Ore.
HIGH LIFE	Schreiner's Gardens, Ore.
TUXEDO	Schreiner's Gardens, Ore.

BED NO. 25

South Row — from East to West

PARISIAN BLUE	Schreiner's Gardens, Ore.
GINGERSNAP	Schreiner's Gardens, Ore.
BLUE PETTICOATS	Schreiner's Gardens, Ore.
FIRE BALL	Schreiner's Gardens, Ore.
TASTE OF HONEY	Schreiner's Gardens, Ore.
JEWEL TONE	Schreiner's Gardens, Ore.
SDLG. S 856-A	Schreiner's Gardens, Ore.
BLUE CHIFFON	Schreiner's Gardens, Ore.
GLOWING TIARA	Schreiner's Gardens, Ore.
HIGH PRAISE	Schreiner's Gardens, Ore.
TAWNY MINK	Schreiner's Gardens, Ore.
WILD RIVER	Schreiner's Gardens, Ore.

BED NO. 26

North Row — from East to West

FUJI'S MANTLE	Schreiner's Gardens, Ore.
SDLG. R 122-2	Schreiner's Gardens, Ore.
ETERNAL FLAME	Schreiner's Gardens, Ore.
MAY DELIGHT	Schreiner's Gardens, Ore.
ROYAL TOUCH	Schreiner's Gardens, Ore.
ANNABEL LEE	Schreiner's Gardens, Ore.
NORTH PACIFIC	Schreiner's Gardens, Ore.
SDLG. V 270-4	Schreiner's Gardens, Ore.
SDLG. T 96 2	Schreiner's Gardens, Ore.
SDLG. T 848-A	Schreiner's Gardens, Ore.
ARPEGE	Schreiner's Gardens, Ore.
SDLG. V 212-1	Schreiner's Gardens, Ore.

BED NO. 26

South Row — from East to West

SDLG. V 472-C	Schreiner's Gardens, Ore.
SDLG. T 760-2	Schreiner's Gardens, Ore.
SDLG. T 1420-1	Schreiner's Gardens, Ore.
SDLG. V 474-1	Schreiner's Gardens, Ore.
TIJUANA BRASS	Schreiner's Gardens, Ore.

CLOUD CAPERS Schreiner's Gardens, Ore.
 CHORDETTE Schreiner's Gardens, Ore.
 SDLG. S 776-R Schreiner's Gardens, Ore.
 SDLG. T 1380-1 Schreiner's Gardens, Ore.
 SDLG. T 1800 Schreiner's Gardens, Ore.
 SDLG. 63-3 Schaan's Iris Garden, Mo.
 HEART OF FIRE Schaan's Iris Garden, Mo.

BED NO. 27

North Row — from East to West

VIOLET DREAM Schaan's Iris Garden, Mo.
 SDLG. 63-9 Schaan's Iris Garden, Mo.
 SDLG. 65-17 Rabe, Ky.
 SDLG. 65-21 Rabe, Ky.
 SDLG. 60-33-2 C. R. Minnick, Mo.
 SDLG. 60-33-30 C. R. Minnick, Mo.
 SDLG. G 66-1 Gordon, Colo.
 SDLG. LP-63-63 Peterson, Utah
 SDLG. LP-63-1000 Peterson, Utah
 MAIN EVENT Peterson, Utah
 SONI CE Peterson, Utah
 SDLG. G 66-15 Gordon, Colo.

BED NO. 27

South Row — from East to West

SDLG. 62-61 Luihn, Calif.
 SDLG. 64-9 Luihn, Calif.
 SDLG. 63-50 Luihn, Calif.
 SDLG. 63-FSB Luihn, Calif.
 LATAH CREEK Judy, Wash.
 OXBLOOD LACE Judy, Wash.
 MIDNIGHT SHADOWS Terrell, Calif.
 PACIFIC HARMONY Terrell, Calif.
 HOSANNA Terrell, Calif.
 WASCO PRIDE Terrell, Calif.
 SDLG. T62-72 Terrell, Calif.
 BLACK ROSE Vallette, Idaho

BED NO. 28

North Row — from East to West

SNOWY MAJESTY Vallette, Idaho
 CARNIVAL OF ROSES Vallette, Idaho
 LADY HELEN Vallette, Idaho
 SMOKE DANCER Vallette, Idaho
 GOLDEN OAK Vallette, Idaho
 LILTING LAUGHTER Vallette, Idaho
 FASHION FLAIR Vallette, Idaho
 RUFFLED STEEL Vallette, Idaho
 ORCHIDS & SNOW Vallette, Idaho
 MAGIC VALLEY Vallette, Idaho
 ROYAL REGALIA Vallette, Idaho
 AMBER LACE Vallette, Idaho

BED NO. 28

South Row — from East to West

CASCADE RIPPLES Vallette, Idaho
 BROADMERE Vallette, Idaho
 PEARL QUEEN Vallette, Idaho
 CRINOLINE BELLE Vallette, Idaho
 GLACIAL ICE Vallette, Idaho
 MARQUESAN SKIES Blocher, Ill.
 CLARION ISLAND Blocher, Ill.
 INNSBRUCK Blocher, Ill.
 OAKBROOK Blocher, Ill.
 ELLEN MANOR Blocher, Ill.
 SDLG. 60-80 F. Brown, Va.
 ICE FOLLIES F. Brown, Va.

BED NO. 29

North Row — from East to West

SDLG. 60-102-B F. Brown, Va.
 GENTLE PRESENCE F. Brown, Va.
 SDLG. 61-14 F. Brown, Va.
 BUTTERFLY WALTZ F. Brown, Va.
 SDLG. 61-23-C F. Brown, Va.
 NATURE'S SPLENDOR F. Brown, Va.
 SDLG. 61-36 F. Brown, Va.
 SDLG. 61-39-B F. Brown, Va.
 SDLG. 61-57-2 F. Brown, Va.
 SDLG. 61-57-6 F. Brown, Va.
 SDLG. 61-57-7 F. Brown, Va.
 SDLG. 61-62-A F. Brown, Va.

BED NO. 29

South Row — from East to West

SDLG. 61-83 F. Brown, Va.
 SDLG. 61-88-2 F. Brown, Va.
 SDLG. 61-88-8 F. Brown, Va.

SDLG. 61-105-A F. Brown, Va.
 SDLG. 61-107 F. Brown, Va.
 SDLG. 61-131 F. Brown, Va.
 SDLG. 61-131-1 F. Brown, Va.
 SDLG. 61-131-2 F. Brown, Va.
 SDLG. 61-144 F. Brown, Va.
 SDLG. 61-144-A F. Brown, Va.
 SDLG. 61-144-B F. Brown, Va.
 SDLG. 61-146-1 F. Brown, Va.

BED NO. 30

North Row — from East to West

SDLG. 61-146-2 F. Brown, Va.
 SDLG. 62-05-A F. Brown, Va.
 SDLG. 62-15-A F. Brown, Va.
 BUTTERFLY HAVEN L. & S. Reynolds, Tenn.
 FLUTED HAVEN L. & S. Reynolds, Tenn.
 GAY HAVEN L. & S. Reynolds, Tenn.
 JEWEL HAVEN L. & S. Reynolds, Tenn.
 VIOLET HAVEN L. & S. Reynolds, Tenn.
 PERFECTLY PINK HAVEN L. & S. Reynolds, Tenn.
 WEDGEWOOD HAVEN L. & S. Reynolds, Tenn.
 SDLG. 16-W L. & S. Reynolds, Tenn.
 SDLG. 41-H-4 L. & S. Reynolds, Tenn.
 PRETTY HAVEN L. & S. Reynolds, Tenn.

BED NO. 30

South Row — from East to West

CHARM SCHOOL Palmer, Mo.
 QUEEN'S FAVOR Palmer, Mo.
 SEABORNE Palmer, Mo.
 SDLG. MR-SH-1 Roberts, Mich.
 SDLG. C-B-101 Roberts, Mich.
 SDLG. 63-12-2 Alexander, Ky.
 SDLG. 63-3-1 Alexander, Ky.
 SDLG. 63-12-1 Alexander, Ky.
 SDLG. 63-4-2 Alexander, Ky.
 SDLG. 63-5-1 Alexander, Ky.
 SDLG. 63-4-5 Alexander, Ky.
 SDLG. 63-6-1 Alexander, Ky.
 SDLG. 63-6-4 Alexander, Ky.

BED NO. 31

North Row — from East to West

WHITE PRIDE Branch, Ill.
 BLUE BALLAD Branch, Ill.
 JUST HEAVEN James, So. Africa
 SHOWMASTER Selle, Mo.
 SDLG. 6001 Branch, Ill.
 SDLG. 6025 Branch, Ill.
 SDLG. 6006 Branch, Ill.
 SDLG. 6036 Branch, Ill.
 SDLG. 6060 Branch, Ill.
 SDLG. 6073 Branch, Ill.
 SDLG. 6076 Branch, Ill.
 SDLG. 6086 Branch, Ill.

BED NO. 31

South Row — from East to West

SDLG. 63-7-1 Alexander, Ky.
 SDLG. 6227 Branch, Ill.
 SPARKLING SNOW Branch, Ill.
 NORTHERN AIRE Goodrick, Wisc.
 SDLG. H 65-7 Heacock, Colo.
 SDLG. 65-11 Heacock, Colo.
 SDLG. 65-13 Heacock, Colo.
 SDLG. 64-7 Heacock, Colo.
 SDLG. 65-5 Heacock, Colo.
 SDLG. 62-E-8 Pierson, Okla.
 COUNTRY DOCTOR Pierson, Okla.
 SDLG. LP-64-164 Peterson, Utah

BED NO. 32

North Row — from East to West

KATHARINE MCLAIN E. & A. Watkins, N. H.
 SDLG. 58-100-d E. & A. Watkins, N. H.
 SDLG. 492-1 Jones, Ore.
 SILVER TRAIL O. Brown, Wash.
 SUNLIT RIPPLES O. Brown, Wash.
 SOUND OF MUSIC O. Brown, Wash.
 SDLG. 4-14J2 O. Brown, Wash.
 SDLG. 4-14N O. Brown, Wash.
 ORANGE PARADE Hamblen, Utah
 MAGNOLIA TIME Pickard, Ill.
 NIGHT MUSIC Pickard, Ill.
 SDLG. 59-24 Pickard, Ill.

BED NO. 32**South Row — from East to West**

SPRING LOVE	Noyd's Iris Garden, Wash.
WENATCHEE SKIES	Noyd's Iris Garden, Wash.
WHITE CRINOLINE	Noyd's Iris Garden, Wash.
WENATCHEE VALLEY	Noyd's Iris Garden, Wash.
SDLG. 63-1	Hunt, Okla.
SDLG. ORB 64-1	Hunt, Okla.
SDLG. J 1361	Merritt, Colo.
(vacant)	
SDLG. 62-206 E	Johnson, Colo.
SDLG. 62-206-D	Johnson, Colo.
SDLG. D-121	Davis, Wisc.
SDLG. W-15-57	E. Weber, Colo.

BED NO. 33**North Row — from East to West**

PEEKABOO	O. Brown, Wash.
PINKTEEN	Quist, N. Y.
LACE VALENTINE	Warburton, Mass.
FROSTED CUPS	Warburton, Mass.
SANDY CAPER	Warburton, Mass.
BERRY PARFAIT	Warburton, Mass.
SNIPPET	Warburton, Mass.
LACE CAPER	Warburton, Mass.
PRETTY PHYLLIS	Housley, Colo.
SUN CHILD	Housley, Colo.
SDLG. 62-101-4	Wolff, Nebr.
ICH LIEBE DICH	Wolff, Nebr.

BED NO. 33**South Row — from East to West**

SDLG. 62-37-2	Wolff, Nebr.
SDLG. 62-37-5	Wolff, Nebr.
SDLG. 62-101-11	Wolff, Nebr.
BOBBIE BEE	Wissbaum, Nebr.
NEBRASKA CENTENNIAL	Wolff-Hildenbrandt, Nebr.
LORI JEAN	Wissbaum, Nebr.
JOY BRINGER	M. Brizendine, Kan.
SDLG. B-37-61	M. Brizendine, Kan.
SDLG. B-41-62	M. Brizendine, Kan.
SDLG. B-35-60	M. Brizendine, Kan.
SDLG. MB-49-66	M. Brizendine, Kan.
BONNIE KAY	Wolff-Hildenbrandt, Nebr.

BED NO. 34**North Row — from East to West**

SDLG. W-7-57	E. Weber, Colo.
SDLG. W-59-11	E. Weber, Colo.
SDLG. W-59-6	E. Weber, Colo.
SDLG. 8-62	Niswonger, Mo.
SAPPHIRE FUZZ	Niswonger, Mo.
SDLG. 6-64	Niswonger, Mo.
SDLG. 17-63	Niswonger, Mo.
SDLG. 33-63	Niswonger, Mo.
SDLG. 10-64	Niswonger, Mo.
SUNSET BLUES	Roe, Calif.
TAFFY TWIST	Roe, Calif.
NORDIC PRINCESS	Housley, Colo.

BED NO. 34**South Row — from East to West**

IRISH LULLABY	Moldovan's Garden, Ohio
STERLING SILVER	Moldovan's Garden, Ohio
MILADY	Moldovan's Garden, Ohio
SDLG. 64-6	Moldovan's Garden, Ohio
CHAMPAGNE MUSIC	Fay, Ill.
FLAMING DRAGON	Fay, Ill.
BLAZE OF BLUE	Austin, Calif.
FLOUNCED FANTASIA	Austin, Calif.
SPOONED BLAZE	Austin, Calif.
SDLG. 330-TRe	Austin, Calif.
SDLG. 357-TBk	Austin, Calif.
SDLG. Q 133 b	Housley, Colo.

BED NO. 35**North Row — from East to West**

LEO HAVEN	L. & S. Reynolds, Tenn.
SDLG. 51L4	L. & S. Reynolds, Tenn.
SDLG. T-90-4	L. & S. Reynolds, Tenn.
SDLG. 89T2	L. & S. Reynolds, Tenn.
MOON RIVER	Sexton, Calif.
PACIFIC PANORAMA	Sexton, Calif.
SMALL TALK	Sexton, Calif.
SDLG. R 62-16	Riley, Colo.
SDLG. D 64-25	Durrance, Colo.
SDLG. D 64-24	Durrance, Colo.
SDLG. D 65-19	Durrance, Colo.
SDLG. D 61-88	Durrance, Colo.
SDLG. D 63-9-B	Durrance, Colo.

BED NO. 35**South Row — from East to West**

SDLG. W-10-A	D. Weber, Colo.
SDLG. R 46-A	Ryden, Colo.
SDLG. R 46-B	Ryden, Colo.
SDLG. R 46-C	Ryden, Colo.
SDLG. R 46-E	Ryden, Colo.
SDLG. R 68-A	Ryden, Colo.
SDLG. 69-J	Ryden, Colo.
PARIS GOWN	D. Lyon, Calif.
BEWITCHING	D. Lyon, Calif.
ROYAL FANFARE	Branch, Ill.
ALADDIN'S FIRE	D. Lyon, Calif.
ATOMIC GOLD	D. Lyon, Calif.
MAJOR RED	D. Lyon, Calif.

BED NO. 36**North Row — from East to West**

SDLG. 59-4	Finney, Wash.
SDLG. 62-15	Finney, Wash.
CLOUDLAND	Randolph, N. Y.
SDLG. 8-171	Hoage, Wash.
AZURE STRIPES	Hoage, Wash.
WA HOO	Holmberg, Kan.
SDLG. 60-11-1	Abell, Calif.
SDLG. 61-25-1	Abell, Calif.
SDLG. 62-2-2	Newman, Idaho
SDLG. 65-1-3	Newman, Idaho
RONALD DEAN	Wolff-Hildenbrandt, Nebr.
SDLG. 63-21	Weyen, Idaho

BED NO. 36**South Row — from East to West**

SUNSET CANYON	Lyon, Calif.
SDLG. 57-15-1	Dubes-Young, Calif.
CAROLAIRE	R. Brizendine, Kan.
ROYALAIRE	R. Brizendine, Kan.
SDLG. B-44-63	R. Brizendine, Kan.
SDLG. B-32-62	R. Brizendine, Kan.
SDLG. B-47-65	R. Brizendine, Kan.
SDLG. B-52-64	R. Brizendine, Kan.
SDLG. B-54-64	R. Brizendine, Kan.
SDLG. B-68-61	R. Brizendine, Kan.
SDLG. A 7-1	Hargreaves, Colo.
SDLG. C 3-1	Hargreaves, Colo.

BED NO. 37**North Row — from East to West**

SDLG. A 8-1	Hargreaves, Colo.
SDLG. D-21-1	Hargreaves, Colo.
SDLG. E 11-1	Hargreaves, Colo.
SDLG. L-65-101	Lilley, Calif.
SDLG. L-65-201	Lilley, Calif.
SDLG. L-65-301	Lilley, Calif.
ORANGE BOWL	Schliefert Iris Garden, Nebr.
SDLG. R 62-7	Riley, Colo.
SDLG. R 00	Riley, Colo.
SDLG. R 62-4-1	Riley, Colo.
SDLG. R 63-1	Riley, Colo.
WINTER OLYMPICS	O. Brown, Wash.

BED NO. 37**South Row — from East to West**

PERKY MISS	F. Smith, Wash.
GRANDIFLORA	O. Brown, Wash.
OLYMPIC JEWEL	F. Smith, Wash.
MAY ORCHID	O. Brown, Wash.
HAWAIIAN HOLIDAY	T. Brown, Wash.
MARK I	Torbett, Mo.
SDLG. 7-11-22	Torbett, Mo.
GOLDEN RUM	Torbett, Mo.
JAY DARLING	Torbett, Mo.
DIANNE JACQUELINE	R. Adams, Colo.
SDLG. 60-DD Y	R. Adams, Colo.
SDLG. 60-89 B Y	R. Adams, Colo.

BED NO. 38**North Row — from East to West**

SDLG. 62-3-1	Wolff, Nebr.
SDLG. 63-2	Martin, Colo.
SDLG. 62-13-7	Wolff, Nebr.
SDLG. W-H 62-20-28	Wolff-Hildenbrandt, Nebr.
FRENCH TONES	Torbett, Mo.
SDLG. D 58-15	Durrance, Colo.
SDLG. D 58-19	Durrance, Colo.
SDLG. R 61-1	Riley, Colo.
DILLY DILLY	Warburton, Mass.
LACE CAPER	Warburton, Mass.
BACCARAT	Gaulter, Calif.
SLDG. G 65-608	Gaulter, Calif.

BED NO. 38**South Row — from East to West**

SDLG. A	Krekler, Calif.
SDLG. B	Krekler, Calif.
SDLG. T 66-26	Tallant, Okla.
SDLG. T 66-3	Tallant, Okla.
SDLG. 61-31	Abshire, Okla.
BROWNIE SCOUT	Gaulter, Calif.
CHRISTIE ANNE	Gaulter, Calif.
COUNTRY SQUIRE	Gaulter, Calif.
JILBY	Gaulter, Calif.
SDLG. G 63-100	Gaulter, Calif.
SDLG. G 63-107	Gaulter, Calif.
HIGH SIERRA	Gaulter, Calif.

BED NO. 39**North Row — from East to West**

SDLG. 61-29-1	Scharff, Tenn.
JAILBIRD	Scharff, Tenn.
SDLG. 61-51-1	Scharff, Tenn.
WESTERN MUSIC	Lyon, Calif.
SDLG. R 61-24-1	Riley, Colo.
SDLG. R 61-24-2	Riley, Colo.
SDLG. R 61-24-3	Riley, Colo.
SDLG. R 61-24-4	Riley, Colo.
SDLG. G 66-10	Gordon, Colo.
SDLG. G 66-14	Gordon, Colo.
SDLG. G 66-11	Gordon, Colo.
PICTURE HAT	Gordon, Colo.

BED NO. 39**South Row — from East to West**

SDLG. 0629-2	Hanna, Ohio
FORTY FATHOMS	R. Adams, Colo.
LAURIE	Gaulter, Calif.
NOB HILL	Gaulter, Calif.
PORT ROYAL	Gaulter, Calif.
NEW DEW	Wolff-Hildenbrandt, Nebr.
SDLG. 62-12-1	Wolff, Nebr.
TEBBY DARE	Wolff, Nebr.
TOWER GROVE	Wolff, Nebr.
LILLI KAFFAI	Wolff, Nebr.
BIT O'PARADISE	Tell's Iris Garden, Utah
SDLG. J 65-(4)-9	Julander, Utah

BED NO. 40**North Row — from East to West**

TEALWOOD	Varner, Ill.
WHITE SWIRL	Cassebeer, N. Y.
SDLG. 631	Varner, Ill.
SDLG. 632	Varner, Ill.
SDLG. 634	Varner, Ill.
SDLG. 635	Varner, Ill.
SDLG. 636	Varner, Ill.
WESTMEYER PURPLE	Westmeyer, Conn.
SALEM WITCH	Spofford, Mass.
BRIGHT SHADOW	Spofford, Mass.
WHITE MAGNIFICANCE	Kitton, England
MANDY MORSE	Spofford, Mass.

BED NO. 40**South Row — from East to West**

TEALWOOD	Varner, Ill.
WHITE CAPE	Kitton, England
ROYAL HERALD	Scheffy, Mass.
MOONSCAPE	Kitton, England
BLUE BRILLIANT	Cassebeer, N. Y.
PLACID WATERS	Cassebeer, N. Y.
CANFORD	Kitton, England
COURT VIOLET	Kitton, England
KITTON #106	Kitton, England
NOTTINGHAM LACE	Hutchison, England
VIOLET FLARE	Cassebeer, N. Y.
PIROUETTE	Cassebeer, N. Y.

BED NO. 41**North Row — from East to West**

SDLG. D 66-2	Durrance, Colo.
SDLG. D 66-1	Durrance, Colo.
KAY STULTS	Stults, Miss.
SDLG. S 65-03	Stults, Miss.
BOLDER	Stults, Miss.
PATCH O'SKY	Stults, Miss.
SDLG. 65-04	Stults, Miss.
ABOVE ALL	Gordon, Colo.
SDLG. 40-63	Niswonger, Mo.

SDLG. 6-62	Niswonger, Mo.
SDLG. 32-63	Niswonger, Mo.
IRENE NEECE	Tell's Iris Garden, Utah

BED NO. 41**South Row — from East to West**

SDLG. M 61-3-1	Mayberry, Utah
SDLG. M 61-3-2	Mayberry, Utah
SDLG. M 62-40-2	Mayberry, Utah
CERAMIC BLUE	Mayberry, Utah
SDLG. 435-A	Carrington, Calif.
SDLG. 435-63	Carrington, Calif.
SDLG. 368-63-A	Carrington, Calif.
SDLG. 602-64-A	Carrington, Calif.
DOGE OF VENICE	Nelson, Idaho
SDLG. J 64-8	Julander, Utah
SDLG. J 64-11	Julander, Utah
SDLG. J 65-(4)-11	Julander, Utah

BED NO. 42**North Row — from East to West**

SDLG. M 60-333	Mayberry, Utah
SDLG. M 60-49-1	Mayberry, Utah
MYSTIC MOOD	Ghio, Calif.
OASIS	Ghio, Calif.
ROYAL TARA	Ghio, Calif.
MAHALO	Ghio, Calif.
BABY SHOWER	Ghio, Calif.
FIRST COURTSHIP	Ghio, Calif.
SDLG. T-1-65	Tams, Utah
PINK DIVINITY	Tams, Utah
PERFUMED LACE	Tams, Utah
RIPPLED GOLD	Foster, Calif.

BED NO. 42**South Row — from East to West**

SDLG. 62-12	Stotts, Iowa
SDLG. 62-B49	Stotts, Iowa
SDLG. A-9-65	F. Foster, Colo.
SDLG. A-40-66	F. Foster, Colo.
SDLG. A-37-66	F. Foster, Colo.
SDLG. A-41-66	F. Foster, Colo.
SDLG. A-3-65	F. Foster, Colo.
SLDG. 64-357	C. & E. Smith, Idaho
SDLG. 64-124	C. & E. Smith, Idaho
SDLG. 64-398A	C. & E. Smith, Idaho
AMBER ETCHING	D. Foster, Calif.
SDLG. 66-2-2	D. Foster, Calif.

BED NO. 43**North Row — from East to West**

LAKE CLEVELAND	Vallette, Idaho
ROSY MOHRN	Vallette, Idaho
MAGNOLIA TIME	Pickard, Ill.
NIGHT MUSIC	Pickard, Ill.
B. BERTOLOTTI SDLG. #1	Bertolotti, Calif.
SDLG. M-15612	Metcalfe, Mont.
SDLG. M-20581	Metcalfe, Mont.
SDLG. M-29562	Metcalfe, Mont.
SDLG. M-3596	Metcalfe, Mont.
SDLG. M-4596A	Metcalfe, Mont.
CORAL COMMENTS	R. Brown, Wash.
BONGO	A. Brown, Wash.

BED NO. 43**South Row — from East to West**

ARCTIC MOOD	A. Brown, Wash.
ARCTIC BREEZE	A. Brown, Wash.
ARCTIC NIGHT	A. Brown, Wash.
LAKE WASHINGTON	R. Brown, Wash.
SDLG. R 4	Harper, Mo.
SDLG. N-10-10	Harper, Mo.
BLUE FORMAL	Schortman, Calif.
SDLG. 63-59-2	Wolff, Nebr.
SDLG. 63-95-8	Wolff, Nebr.
SDLG. BB 63-12	Berkenkotter, Colo.
SDLG. BB 63-2	Berkenkotter, Colo.
ORANGE PARADE	Hamblen, Utah

BED NO. 44**North Row — from East to West**

SDLG. J 4261	Merritt, Colo.
SDLG. J 2961	Merritt, Colo.
SDLG. W-64-7	Wedow, Colo.
KARIMA	Keefe
LIGHT & LOVELY	Rees, Calif.
ANGEL BRIGHT	Rees, Calif.



Notes on growing **Iris**

J. O. RILEY

J.O. Riley and his wife, Kay, raise beautiful iris at their home in north-west Denver. He is also an avid iris hybridizer. His lovely tan creation, 'Jamaica Rum', is one of several Riley iris to be found at Denver Botanic Gardens and in other area plantings.

TO THE BEGINNER — Iris are among the easiest perennials to grow. They survive with less care and reward you with good bloom with a minimum of attention. The innate hardiness of the iris plant lends itself particularly well to culture by the beginner. You need not worry too much if iris plants appear to have been out of the ground for too long a time. At this point it might be well to tell you that the iris root is known as a rhizome. It is not a tuber, nor is it a bulb.

SOIL PREPARATION — Work soil well to a depth of 10-12". If your soil is heavy, incorporate sand and/or peat moss so that moisture does not stand, and so that the soil does not pack. Most soils in our area are nearly neutral so that it is unnecessary to worry about an acid condition. Slightly alkaline soil will not hurt iris. You will note that most of these instructions might apply to almost any of the plants

or flowers that you grow in your garden.

FERTILIZATION — Iris will grow without feeding but, like any other plant, will respond to its application. In the matter of fertilizers, garden sense should be used in liberal quantity. A good garden soil will grow fine iris. The same feeding program that you use for most garden plants will give adequate nourishment to your iris. If you use fertilizer strong in nitrogen, use care not to get the fertilizer near the roots or the crown of the plant or you may have some trouble with rot. Further, an excessively heavy nitrogenous feeding will promote very lush growth and result in soft rhizomes which are more susceptible to rot. In preparation of your new iris bed, spade in a good application of compost below the roots. Well-processed compost is ideal for it furnishes humus and valuable soil organisms.

An application of a well-balanced fertilizer is desirable, applied as a top dressing, dusted around and in between the plants in early spring or very late fall. Steamed bone meal and superphosphate are fine top dressing materials. The application of agricultural gypsum in the spring just as growth starts is recommended by some. Others feel that the application of agricultural gypsum in the late fall will do much to ward off winter rot, crown rot and other diseases. It is also recommended as a soil conditioner. It is easy to overdo iris fertilizing but it is not desirable to omit feeding entirely.

WHEN TO PLANT — For best results plant during July and August. In some sections of the country, planting can be done over a wider range of time, but in our own city, July and August have been proven the best months. Iris can be moved as soon as bloom is finished, without damage. However, a short resting period is recommended, so it is wise to begin your planting in early July. Although we may have much fine weather through September and October, our cold nights do not lend themselves too well to growth and plants should be well-established to go into the winter season. A question which often arises is "Can iris be transplanted early in the spring?" The answer is "Yes," but spring planting or transplanting may result in the loss of bloom for that season. Few nurseries sell iris in the spring.

WHERE TO PLANT — The ideal location for your iris is a sunny, well-drained spot, with sunshine at a minimum of half-days. Some varieties, such as the pinks, the reds and the blacks will show to much better advantage (hold their color without fading) if planted in partial shade. Iris generally will not do well in deep shade. No

water should stand in your iris beds. If this is a condition which prevails in your garden, then raise the beds slightly above the level of the garden paths. This will give the drainage the iris plants need.

DEPTH TO PLANT — Place the rhizomes just below the surface of the ground, but never more than 1" deep with the roots well-spread out underneath so that the rhizome is within reach of the sun's rays while the roots beneath are in moist (not soggy) soil. Be sure to firm the soil tightly around each rhizome when planting. An air space under the rhizome may result in rot. Ordinary good garden practice of watering and setting soil on newly set plants will apply to iris.

WATERING — This depends altogether on the location. I, personally, like to "mud" new rhizomes in so that the earth is set solidly around the rhizome and roots. Newly set plants grow an entirely new set of roots. The old roots attached to the rhizome do not continue the practice of drawing food from the earth. Actually, the old roots on a rhizome serve only to anchor it until new roots are grown. After the plants are established, water at fairly long intervals in dry weather. The common mistake is to give iris too much water. At times of excessive heat, newly set plants can be shaded by an upright shingle or some other type of protection which will cut off the direct rays of the sun for a few days.

GENERAL GARDEN CARE — We prefer to cultivate shallowly after each rain when the ground has dried sufficiently for proper tilling. As the iris grows, the outside foliage becomes limp. Some remove these outside leaves frequently; however, my own practice is to make it a point to see that the dead leaves are thoroughly cleaned away before the beginning of

winter and again early in the spring when growth begins. We never trim the foliage of iris plants except when transplanting. If there is a considerable degree of tip burn or leaf spot, the leaves may be trimmed to present a more attractive appearance. The question of trimming iris plants arises frequently. My own feeling is that trimming leaves reduces the ability of the plant to absorb sunlight in order to produce part of its food. Furthermore, trimming will produce a uniform appearance for only a short time. The trimmed plant will actually appear more irregular in shape than one which has not been touched. Bloom stalks should be trimmed level with the ground after bloom has been completed. It is desirable to do the cutting on a warm day so that the cut heals quickly.

SHOULD OLD CLUMPS BE THINNED AND WHEN—Yes, after they become crowded or when an open spot begins to show in the center of a clump, giving the impression of a circle with an open center. Some authorities say that iris should be reset every four years; others say from every three to five years. Iris varieties grow at different rates of speed. One variety may reach the “ring” stage in three years; another may go as long as 5 or 6 years. Actually, this is an advantage, since all varieties do not need to be thinned or reset at the same time. Iris should be given plenty of space to begin with. I try to keep tall bearded varieties at least three feet apart. The dwarfs, of course, may be planted closer. Dig up your old clumps, remove and discard the old center divisions that have bloomed and replant only the fresh, larger foliage fans after the soil has been renewed. If you have a favorite variety which you wish to use in mass



Remember girls, in hybridizing — try for long, slender lines. We're living in a streamlined age!

planting, then the old center rhizomes and the smaller fans may be planted in a nursery row for a year.

WINTER PROTECTION — My wife and I have grown from four to six hundred varieties in our back yard for the past several years and we have never found it necessary to mulch for winter protection. In some sections of the country, marsh hay, straw or some weed-free litter is recommended. I have noted it recommended that newly set plants must be protected but, as I outlined earlier, if new plants are set at the proper time they will become established before winter sets in and will not be subject to heaving, a result of freezing and thawing. Leaves should never be used as mulch because of the tendency to mat and to hold moisture around the crown of the iris plant. If you are in the habit of mulching your garden, continue to do so; it will do no harm. Of course, the mulch should be removed when spring growth begins.

LEAF SPOT — This is easily recognized by the characteristic brown spots on the foliage. The suggested treatment is to remove and burn the diseased portion of the leaves and then spray or dust with Bordeaux or Fer-mate at the strength recommended for roses. Phaltan is excellent for leaf spot. In using sprays, use a good adhesive agent (such as a small pinch of detergent) so that the spray will adhere to the foliage. Leaf spot does not occur to any great extent in this area. It is not dangerous to the plants but is rather unsightly and is a condition which should not exist in a well-cared-for garden.

OTHER IRIS DISEASES — I am sorry to say that up to the present time very little or no research has been done in this connection. The most common diseases are Botrytis or winter rot, crown rot, the leaf spot mentioned above, and rot. It is thought that Botrytis results from some combination of freezing and thawing, which results in the rhizome being reduced to a dry, pithy condition. One grower in this region uses an application of agricultural gypsum heaped on the crown of the plant and states that no Botrytis has existed in her garden for three years. Crown rot takes place at

the point where foliage grows from the top of the rhizome. It is indicated by the foliage turning a yellowish-brown; if cleaned out and exposed to the air, no further damage will result to the plant. Some growers use an application of dry sulphur — others use a Clorox solution. Rot, also known as soft rot, may attack rhizomes at any point. I have never had much, if any, soft rot in my own garden, and my opinion is that it occurs most frequently in extremely old clumps which were not thinned or divided at the proper time.

LACK OF BLOOM — Some years some varieties may be very husky, vigorous plants, but without any bloom stalks. Blame this on the weather. When the bloom stalk bud starts to grow up through the leaf sheath it is very sensitive to freezing. An early warm spell that starts its growth, followed by freezing weather later, will destroy chances for bloom on that plant for that year. Sometimes, a single misshapen blossom will appear down in the leaves.

TO CONCLUDE—Let me say that iris, “the poor man’s orchid”, is an easily grown, richly rewarding perennial that all should try.

Meet the Natives, M. WALTER PESMAN, 7th Ed.,

Rev. 1967 is now available at the

Conservatory Gift Shop.

Spiral Bound. \$4.50

REGION TWENTY
of
The American Iris Society

Presents

An Arrangement Show — "AMERICA THE BEAUTIFUL"
at

Denver Botanic Gardens Conservatory
1005 York Street

SATURDAY, JUNE 3, 1967 — 12:00 noon to 5:00 p.m.

The Public Is Invited

MR. CHARLES P. GORDON, *Regional Vice-President*

Show Committees:

General Chairman, Mrs. Jess Gibson, Littleton

Assistant Chairman and Entries Chairman, Mrs. W. G. Gressett, Denver

Staging Chairman, Mrs. J. V. Carroll, Lakewood

Judges Chairman, Mrs. Walter Freudenberg, Colorado Springs

Placement and Classification Chairmen, Mr. & Mrs. Thomas L. Magee, Littleton

Clerks and Awards Chairman, Mrs. Sam Heacock, Denver

Entries are open to all adult persons and are not limited to A.I.S. or Garden Club members. Entries by advance registration only. Make reservations with Mrs. W. G. Gressett, 1523 South Clayton Street, Denver, Colorado by June 1. If, for some reason, an exhibitor finds it impossible to fulfill his obligation, please notify Mrs. Gressett so a substitution may be made.

"America The Beautiful"

Class 1. "O Beautiful for Spacious Skies." Invitation only.

Class 2. "For Amber Waves of Grain." Open to master and senior judges.

Class 3. "For Purple Mountain Majesties." Open to senior judges.

Class 4. "Above the Fruited Plain." Limited to student judges.
To be interpreted by the exhibitor.

Class 5. "Thine Alabaster Cities Gleam." Open to amateur accredited judges.

Class 6. "May God Thy Gold Refine." Open to amateur accredited judges.

Class 7. "God Shed His Grace On Thee." Religious theme — open class.

Class 8. "From Sea to Shining Sea." Open class using iris other than tall bearded.

Iris are to be used in all classes but need not be grown by the exhibitor.

Complete schedules containing scale of points for judging are available from committee members.



Rainbow Iris Gardens At City Park

EVERETT LONG

WHILE ATTENTION this year is focused on the Guest Iris planting at Denver Botanic Gardens, *Green Thumb* readers are reminded that other iris beauty spots abound in the Denver area.

Elsewhere in this issue is a directory of private and commercial iris gardens open to the public. At City Park is the Rainbow Iris Garden. The basic planting here was done some six years ago when beds were arranged in rainbow arc form. Individual flower specimens here will not be as large as those in the two-year-old Guest Garden, since crowding will diminish size, but the over-all view should be worth a visit to this planting.

Older plantings will also be found in

Denver Botanic Gardens. Compared to the Guest Iris they will show some ravages of time, but here you will find many of your old favorites. Of interest at Denver Botanic Gardens will also be the Regional and National Iris Test Gardens. The Randolph Collection comprised of species collected in Europe and Asia Minor has diminished in recent years, but still affords a chance to see the ancestors of today's modern iris.

Cranmer Park, with its sun dial and panoramic view of the Continental Divide, has a modest planting of iris intermingled with other flowers.

Surplus iris from established plantings have been used along Denver boulevards to enhance the beauty of the Mile-high city.

Iris Research at Colorado State University

CARL JORGENSEN

(Mr. Jorgensen is Associate Professor of Horticulture at Colorado State University.)

IN 1950, on behalf of Colorado State University, I purchased 50 varieties of iris for planting in a small bed set aside for plant propagation classes. The iris lends itself well to the study of asexual propagation by division. Included in the starter collection were all the Dykes Medal winners to that date. The following years we also included an exercise in hybridizing technique. The iris is an ideal flower for student work in hybridizing because of flower size, time of bloom, ease of pollination, etc. Furthermore we could save the seed and conduct germination studies in fall and winter classes. We were spurred on by the knowledge that little was known about inheritance of tetraploids. This was doubly true in the case of iris, since low germination percentages coupled with delayed emergence made the study of population ratios and segregation in iris species difficult.

I suppose the 1963 Denver convention had much to do with our decision to begin working in earnest with iris. The many beautiful new introductions, the advances made in both color and form made us anxious to enlarge our collection. We are indebted to Denver Botanic Gardens and individual breeders who so generously responded to our request for new iris for our test garden.

This garden is located in the heart of the campus. It contains some 350 varieties and is usually in bloom the week of graduation. Thousands of visitors and Fort Collins residents view this Region 20 test garden each spring.

In 1965, 360 guest iris were planted for our 1967 convention. These are located in another area near the heart

of the campus. Over 80 breeders are represented. Weather cooperating we look for all of you to tour the guest beds here on June 1. Most of these guests have made excellent growth and should put on a gorgeous show by convention time. The winter of 1966-67 was mild and very few losses were experienced.

I don't wish to elaborate on our seed research. As you know, it centers around increasing the germination of iris seed by various treatments. Some of the results have appeared in the Bulletin. We have been permitted to use the technical apparatus and growth chambers of the National Seed Laboratory here on campus and our latest research deals with determining the best germination temperatures for after-ripened iris seed. We would be pleased as punch to have you drop in for a visit to see our research facilities while here for the convention.

Our experimental seedling plots are located on South Campus (the Bay Farm). Here you will be able to see the 4000 seedlings planted in 1965. These should have been evaluated in the spring of '66, but due to a late freeze we had spotty bloom and we decided to carry them over to bloom time in 1967. Some of these crosses will have over 200 seedlings blooming from the same cross. Another 4000 seedlings planted in 1966 will be in bloom for the first time in 1967.

We hope Mother Nature will read this item and enable us to present you with a rainbow show when you visit our campus in 1967.

a gardener looks

at IRIS

AVALONNE KOSANKE

THIS ARTICLE is not intended to be a scientific review of the genus *Iris*. It is more a gardener's survey of Lawrence and Randolph's (1959) classification of the genus with additional notes from other sources. In other words, it is not the whole family tree, but rather a little wooden spoon carved from it to stir your interest in irises.

The genus *Iris* is divided into four subgenera primarily on the basis of the root characteristics:

1. *Iris* — nearly two hundred species having rootstocks which are rhizomes.
2. *Nepalensis* — A single species having a minute rhizome which gives rise to a bundle of fleshy roots.
3. *Xiphium* — (ziff' - ee - um) About twenty species having bulbs which remain rootless during their dormant period.
4. *Scorpiris* — More than thirty species having bulbs with fleshy roots which remain attached during the dormant period.

Subgenus *Nepalensis*

For the moment, let us skip subgenus *Iris* and consider instead subgenus *Nepalensis* with its single species, *I. decora* Wallich. This iris is found in the

Himalayas and southwest China. Growth ceases in autumn, and the roots remain frozen all winter. Unless these conditions can be duplicated, the hemerocallis-like rootstock must be lifted and stored over winter. It blooms with the tall bearded irises on a 9-inch stem. The flower is quite flat, 2 to 3 inches across, veined lilac with an orange patch on the falls, and has prominent style arms. Both seeds and roots are difficult to obtain.

Subgenus *Xiphium*

You will note the last two subgenera are concerned with bulbous irises. One remains rootless in dormancy, the other retains fleshy roots in dormancy. Subgenus *Xiphium* includes those species whose bulbs are rootless. There are two distinct types of bulbs within this subgenus giving rise to section *Xythium* which has naked bulbs, and section *Reticulata* which has bulbs covered by a finely netted (reticulated) fibrous coat. Both sections bear flowers in which the standards are relatively large and erect.

SECTION XIPHIMUM boasts the lovely Spanish, English and Dutch irises known to everyone through their use by florists and treasured by gardeners for their handsome bloom in the

border. Their ancestry, hence their growing needs, varies so much that few gardeners can grow all three. The eight species concerned come from Spain, Portugal, southern France and north Africa. Most Spanish irises are variations of *Iris xiphium* L. They antedate the Dutch irises which are similar in appearance. Both send up foliage in winter necessitating protection. Damage to foliage of bulbous irises weakens their bulbs and reduces their ability to flower. May-flowering Spanish irises are shorter, slighter, more limited in color than the Dutch. They enjoy light soil, dislike wet feet, and their scant foliage makes them perfect companions for more deeply planted daffodils.

Dutch bulb growers developed the better traits of *Iris xiphium* and its variants. They added the bright blue of *I. tingitana* Boissier & Reuter, which was native to Tangiers, and other species. Like the Spanish irises, these ask for a well-drained, sunny spot in the garden. They are later, larger, more varied in color. Their straight, strong 2-foot stems and lasting quality make them a favorite cutting flower in the May garden.

The elegant, broad-petaled English irises flower in June. They are almost pure descendants of *Iris xiphioides* Ehrlich which is native to the snow-covered meadows of the Pyrenees. Its bulbs were carried by traders to gardens in the area of Bristol, England and there were "discovered" by Dutch bulb growers. It demands the cool, moist, somewhat acid condition of its heritage. Its flowers are often affected by a virus which blotches the color.

SECTION *RETICULATA* irises, in addition to the fibrous coats on their bulbs, are distinguished by their four-sided leaves. The exception is *Iris bakeriana* M. Foster which has eight-sided leaves. Reticulatas originated in

Asia Minor, the Caucasus, and along the eastern Mediterranean. They prove hardy well into Canada if given a sheltered location, rich, gritty soil and sharp drainage. Their leaves appear with the flowers and at about the same height. The exquisite form of *I. vartanii* M. Foster is a lovely way to start the iris parade in January. Collectors follow this with the brilliant blue Major form of *I. histrioides* (G. Wilson) A. Arnott which withstands more cold and is larger than *I. histrio* Reichenbach fil. Next to appear is the sturdier, yellow-flowered *I. danfordiae* (Baker) Boissier, one of the few iris species to be named for a woman. Its crisply rounded falls are dappled with green and the standards are so rudimentary as to escape notice. What appears to be standards is really a rosette of widely crested styles. The type species, *I. reticulata* M. Bieberstein wisely delays until crocus time to send up both its leaves and its stemless, violet flower on a 6-inch perianth tube.

Subgenus *Scorpiris*

More than thirty species comprise the third non-rhizomatous subgenus *Scorpiris*. They are commonly known as "junos." All have fleshy roots which remain attached through dormancy. The flowers are borne on short stems rising directly from the leaf axils. Their standards are often minute, spreading or drooping, while the conspicuous style arms are held erect. The leaves are broad, deeply channeled, and closely crowded on erect stems from 6 to 20 inches tall. They look for all the world like miniature corn plants until the flowers appear. They originated in Asia Minor, Turkestan and along the western Mediterranean. Most like good drainage, though others thrive in heavy clay soil more suited to lilies. Most like a dry roasting in summer.

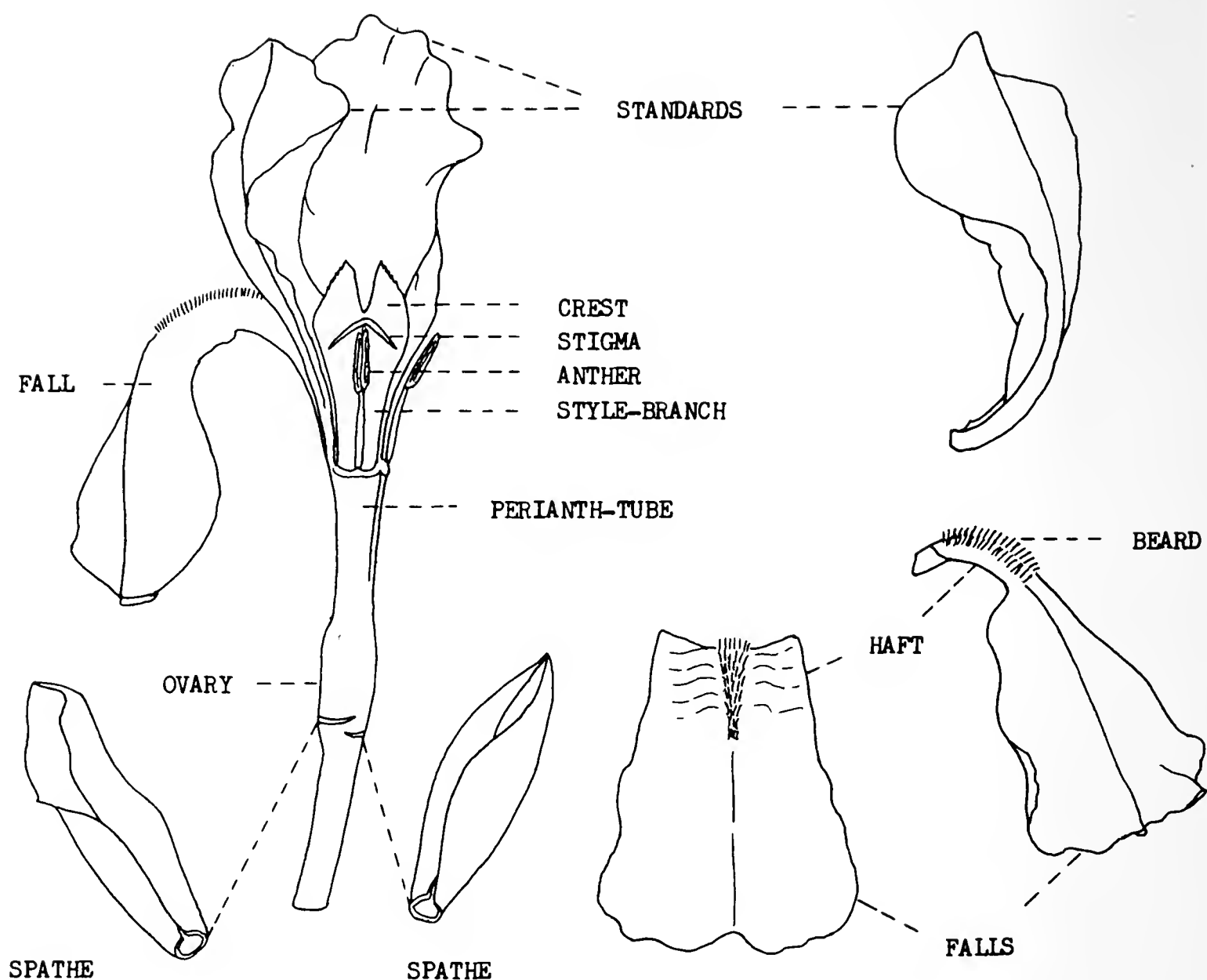


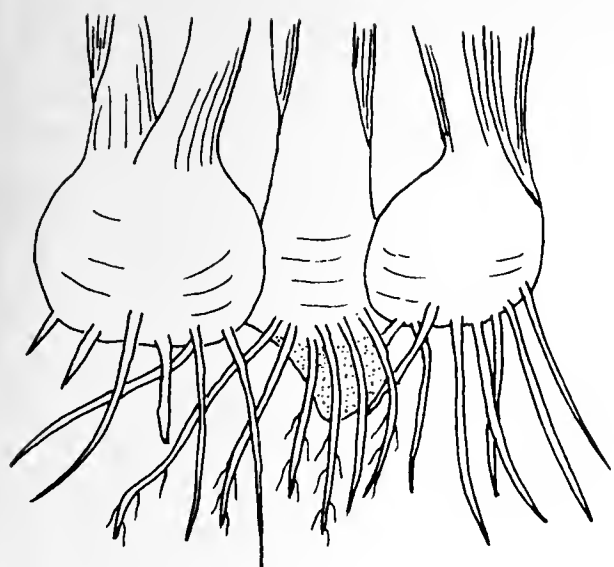
Fig. 1 A partially dissected iris flower redrawn from Randolph (1959).

Slender, carrot-like storage roots subtend each small bulb. If these are injured or broken off, the bulb usually fails to bloom and may not survive. This complicates lifting, shipping, and often accounts for failure in a new planting. Throughout the literature, "sea-green tints" on the blue flowers of *Iris persica* L. are held unique. This native of Iran has happily adapted itself to Clarksville, Tennessee, where it blooms with the crocus. From Bokhara comes the more widely grown *I. Bucharica* M. Foster commonly called the "corn-stalk" junco. This species is taller and may bear as many as seven yellow and white flowers on its 12-inch stems. It takes well-drained, gravelly soil for January flowering. *I. planifolia* (Mill.)

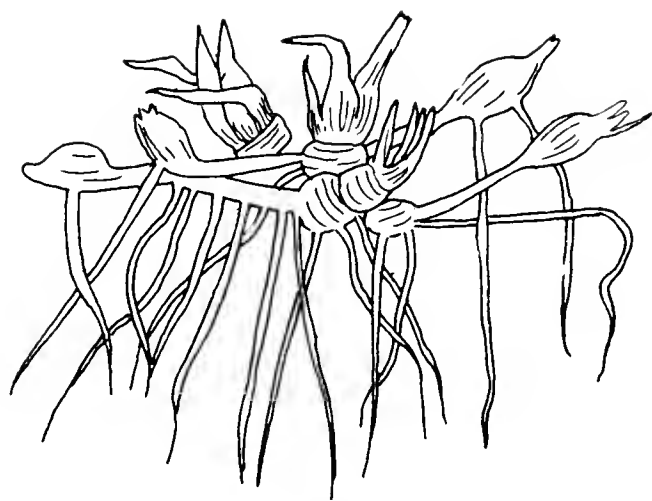
Asch. & Graebn. *I. alata* (Poiret a synonym). Native to slopes of Mount Etna in Sicily and mountains of southern Spain, this species enjoys winter moisture. Its vanilla-scented flowers are large for juncos. Its hafts (See fig. 1) bear wide appendages which arch over the style arms giving it the name "alata" meaning "winged."

Subgenus *Iris*

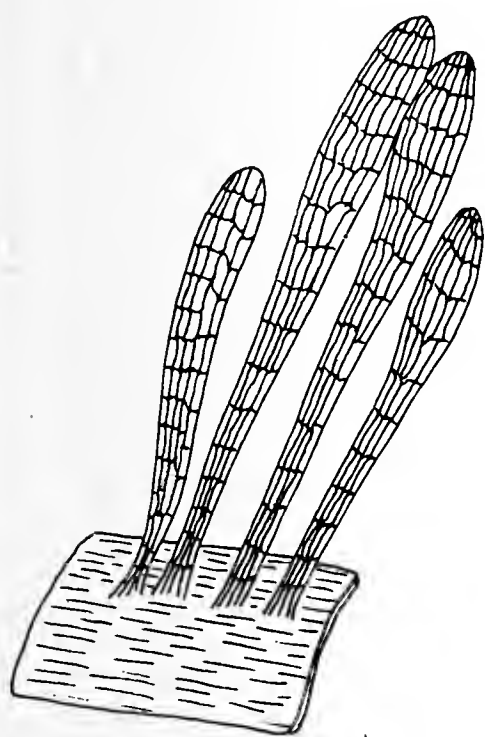
The largest, most complex of all the subgenera is subgenus *Iris*. It includes about two hundred recognized species all having fleshy, rhizomatous (See fig. 2) rootstocks, non-fleshy roots, and flowers bearded, beardless or crested. From this subgenus come most of our garden varieties and all our native spe-



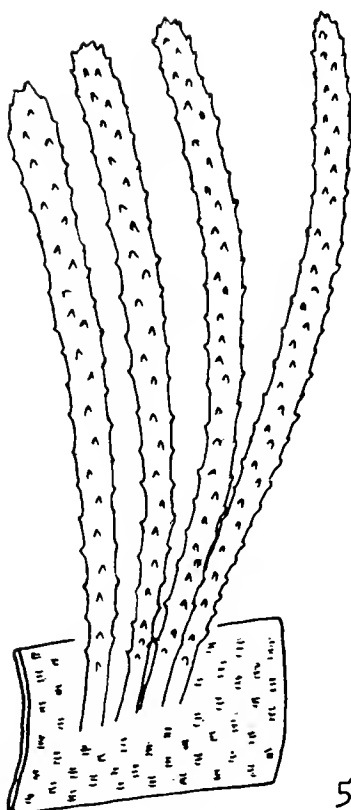
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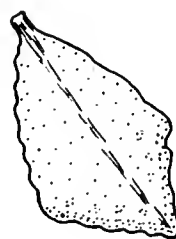
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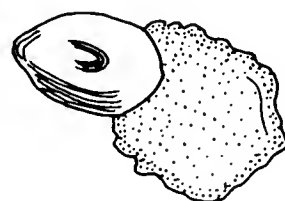
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Figs. 2-7 Identifying characteristics used in section *Iris* redrawn from Randolph (1959). Fig. 2 Rhizomes of tall bearded iris. Fig. 3 Stoloniferous rhizomes of aril-type iris. Fig. 4 Multicellular hairs of tall bearded iris. Fig. 5 Unicellular hairs of tall bearded iris. Fig. 6 Seed of tall bearded iris. Fig. 7 Seed of aril-type iris.

cies. Let us divide it into two sections for better understanding. Section *Iris* includes all rhizomatous irises having beards of unicellular or multicellular hairs. Section *Spathula* includes all rhizomatous irises having no beard but sometimes a crest or elevated, toothed ridge on the haft of the species of subsection *Evansia*.

SECTION IRIS is easily broken down into four subsections. Subsection *Iris* includes all rhizomatous irises bearing

beards of multicellular, club-shaped hairs (See fig. 4) and having no aril, the small whitish collar surrounding the point of attachment of seed to capsule. (See fig. 6).

Subsection *Hexapogon* (hex: six plus pogon: beard) includes all rhizomatous irises bearing beards of unicellular hairs (See fig. 5) on both standards and falls, having seeds with an Aril, (See fig. 7) and rhizomes stoloniferous. (See fig. 3).

Subsection *Oncocyclus* includes all rhizomatous irises having beards of unicellular hair scattered over the haft of the falls, seeds with an aril, and rhizomes neither stoloniferous nor gnarled.

Subsection *Pseudoregelia* includes all rhizomatous irises with beards of unicellular hairs on the median line of the falls, seeds having an aril, and rhizomes not stoloniferous but rather compact and gnarled.

Consider first the subsection *Iris*, for it includes many familiar faces among our garden irises. Both the calendar and the yardstick can be used to divide the section into six horticultural groups. It is well to remember that countless modern forms and extensive breeding programs modify many of the characteristics which hold for species.

Miniature Dwarfs: Usually earliest bloomers no more than 10 inches tall; flowers nearly stemless with 2- to 3-inch perianth tube; if stemmed, not or seldom-branched; leaves curved and shorter than flowers; fourteen species. *Iris chamaeiris* Bertolini gives persistent foliage and flowers on real stems. *I. pumila* L. gives later bloom, transmits "spot" pattern independent of petal color, giving amoenas, variegatas and neglectas. Miniature dwarfs also carry anthocyanin inhibitor. Breakthrough to correcting faults of poor proportion, tucked falls, muddy color, limited patterns came about 1950.

Standard Dwarfs: Usually later than miniatures and 10 to 15 inches tall; leaves tall as flowers and not curved; flowers fragrant, 3 to 4 inches across with beards of every color; yellow color in dwarfs due to flavone pigment only; plants hardy, vigorous, adaptable, tending to form cushions; eight species.

Miniature Tall: Bloom with the tall bearded on stems 15 to 28 inches tall; stems more wiry, slender, flexible; flowers no more than 3 inches across; entire plant in good proportion; more suited to cut flowers, hence called "table iris"; six species. *Iris variegata* L. from Hungary and the Balkans is parent of many modern iris and known for its yellow standards and brown falls.

Intermediates: Usually bloom between Standard Dwarfs and Standard Tall Bearded; stems 15 to 28 inches tall, stiff, branched and taller than foliage; tough, vigorous and often remontant (blooming again in the fall). In this group belong no pure species but rather five clones with forty-four chromosomes and not capable of being reproduced from seeds, as in species, but treated by Linnaeus and others as species. They have been so long in cultivation that their origin lies in question. Albicans, the white iris from Arabia, was planted by Mohammedans to mark their graves and is found along the entire northern coast of Africa to Spain from which it came to Mexico, then up the coast into California with the earliest settlers. Florentina, the fragrant orris root of cosmetic and medicinal circles, found in Italy and northern Europe, is another of this group.

Border Iris: Usually bloom with the tall bearded on stems 15 to 28 inches tall; stems stiffly erect, slightly branched; flowers 4 to 6 inches across; leaves shorter than flower stems. Six species, possibly more. Blooms are too large for the stems, plants lack hardiness, branching is poor, yet these are persistent border favorites.

Standard Tall Bearded: Bloom at end of bearded iris season on stems 28 or more inches tall; flowers 4 to 7 inches across; stems stiffly erect and branched. At least seven species including *Iris pallida* Lamarck which has left its mark on so many cultivars in the form of blue-green foliage. Rhizomes are typical. (See fig. 2).

The next three subsections of section *Iris* are commonly called the "aril" irises since their seeds bear an aril. All have a second characteristic in common: beards composed of unicellular hairs.

Subsection *Hexapogon* irises are also known as "regelias" and have all six perianth segments bearded. The rhizomes are usually stoloniferous. Their blooming begins earlier than and terminates with the tall bearded. This group has a dominant factor for the signal patch, a prominent V-shaped spot of contrasting color surrounding the beard, on the falls. The rather small flowers are characteristically slender, elongated, the standards and/or falls pointed. The flowers are exotically veined, splashed, blended and patterned, often having contrasting linear bands of blue, black, brown, orange and violet. Even their pollen joins the color parade in blue, green, olive or chartreuse. The stems are 12 to 20 inches, foliage upright, long and narrow-bladed. Each produces two or three terminal flowers which open in sequence. They come from the Himalayas and Turkestan, so enjoy long winters, good drainage and deeper planting than tall bearded. They withstand intense cold, being among the hardiest of the arils. There are ten species in this group.

Subsection *Oncocyclus* are popularly called "oncos" from the Greek word

meaning circular tumor referring to the conspicuous aril of their seeds. This fabulous group was reportedly grown by an Egyptian Pharaoh in his Syrian garden about 1500 B.C. They have beards of unicellular hairs scattered over their falls; their rhizomes are neither stoloniferous nor gnarled. Stems may be 3 to 30 inches tall topped by a solitary flower which may last a week. The flower is quite large, standards larger than falls, extremely broad-domed, rounded, arched and touching at the apex with strong midribs. Substance is excellent. Falls are broad of haft, often tucked under, and the style arms are large, protruding prominently. The spathe is tubular and without a keel. The anthers are fat, showy, and bear very fertile, creamy yellow pollen. Native to near-desert areas, such as Egypt with only 8 inches of rain annually, the oncos demand excellent drainage and a long, dry rest period immediately following their blooming time. *Iris gatesii* M. Foster was immortalized in 1923 by William Mohr in a species-cross seedling which was to bear his name. There are forty fascinating species, each worthy of mention but space does not permit.

Subsection *Pseudoregelia* bears its beard of unicellular hairs on the median line of the falls; the aril of its seeds is very small; the rhizomes compact and gnarled and not stoloniferous. The seed capsule does not split at its apex as in other arillate subsections, but rather opens at three points somewhat below. There are five species in this group.

SECTION SPATHULA of subgenus *Iris* is the final portion of our study. It includes the crested and non-

bearded species of rhizomatous iris. The first section of *Spathula* is simply disposed. Subsection *Pardanthopsis* has only one species, *Iris dichotoma* Pallas, commonly called the "vesper" iris since its flowers open late in the afternoon and close by evening. The dainty, evanescent flowers are muted in color. Their falls bear neither beard nor crest. The thin, abundantly forked, 2-foot stem towers over its foliage. Native to Siberia and north China, this species is hardy. Perhaps its most desirable quality is that of blooming from late July until early September.

Subsection *Foetidissima* is also composed of a single species, *Iris foetidissima* L. The foliage, when crushed, has a fetid odor. The unimposing flowers are variously described as gray, green or yellow; the falls bear neither beard nor crest; the seeds lack an aril and persist in the pod; stems lack abundant branching. If grown in the sun, the seeds develop a vermilion color which lasts well indoors.

Subsection *Apogon* (without a beard) is an extremely diverse grouping of approximately ninety species. Their stems are not much branched; their seeds lack arils and do not persist in the capsule; the foliage is not foetid; the flower lacks both beard and crest. This subsection is so complicated that it requires sixteen series to accommodate the differences. Most of our native irises lie within its limits. Also the familiar Siberian irises, the spurias, the Japanese, and the complex of Louisiana irises belong here. Colorado's one native species, *Iris missouriensis*, Nuttall, appears in series fifteen. This subsection is too important to treat in a cursory fashion in this paper.

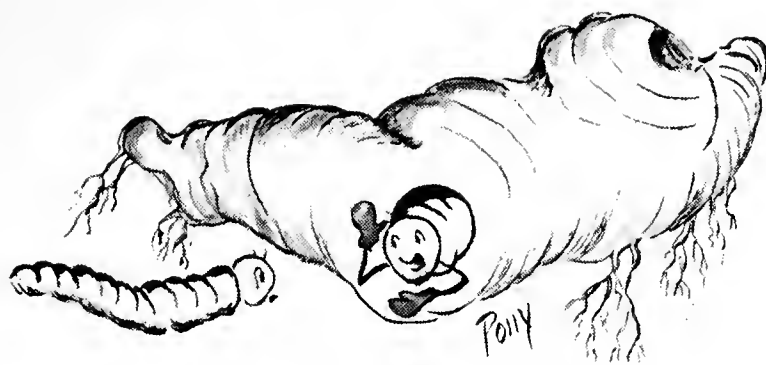
Subsection *Evansia* is the only remaining, small subsection of *Spathula* to examine. Unique among the irises, this group bears cockscomb-like crests upon the midrib of its falls. Most of these species come from the Orient with the exception of *Iris lacustris* Nuttall, and American species from the Great Lakes region.

**A choice is gone unless we choose it
A talent grows or else we lose it
A tool must toil, and man must use it
Or else it is no tool at all.**

The "spoon" is carved. May it serve you well as you lean over the next iris you meet. See the history behind its present loveliness and dream a little over the iris of tomorrow.

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Come on boy! This is delicious —
it's an imported one!

Iris gallore . . . here, there, everywhere!

In addition to the iris display at Denver Botanic Gardens, readers of The Green Thumb will find many gardens throughout the state that feature iris. These plantings range from small, charming home gardens to large commercial operations.

To help trip planning please note the average best blooming time for tall bearded iris in the Denver area is the last of May and early June. In Pueblo the season may be as much as a week or ten days earlier; in Steamboat Springs and Craig it will average two weeks or more later.

Owners of the following gardens have indicated willingness for iris lovers to visit their plantings. Unless otherwise indicated, the gardens are open at all reasonable hours.

ARVADA

Alpahr Gardens
5080 Allison St.

BASALT

Mrs. Ruby Gold
Fourth Street

BAYFIELD

Mountain Meadows Iris Gardens
(Mrs. Ruth Pressey)
8 miles north of Bayfield on the Vallecito Road
Mrs. Henry L. Shields
Rt. 1, Vallecito Lake Road

BOULDER

Long's Gardens
3240 Broadway

BRUSH

Mrs. Henry Hoffman
Rt. 1, Box 73, — ½ mile east of Mill St.

CANON CITY

Mrs. F. M. Schwieterman
910 South 12th St.
Mrs. Merle Wilson
209 Grandview

CASTLE ROCK

Ralph & Mae Hargreaves
Lariat Drive in Happy Canyon — 6 miles north
of Castle Rock

COLORADO SPRINGS

Dr. and Mrs. Ralph W. Adams
3927 Linden Circle
Dr. and Mrs. J. H. Brown
1015 Bonfoy
Frank Foster
3024 Mesa Road
Mrs. H. P. Hollingsworth
308 North Logan St. (Logan is 1500 east
just off Platte Ave.)

Dr. Philip A. Loomis
1414 Culebra Ave. with additional planting at
1330 North Walnut St.

CRAIG

Sue N. McLane (Ranchera Plena Flora)
1393 Yampa Ave.
(Open June 12-20)
Artie Talkington
838 Barclay

DENVER

Dr. J. R. Durrance
4301 East Cedar
Mr. and Mrs. Charles P. Gordon
414 Eudora
Mr. and Mrs. S. L. Heacock
1235 South Patton Court
Hurlburts Iris Gardens
536 South Eudora St.
(7 a.m. to 6 p.m. Monday thru Friday;
call 333-9637 for Saturday and Sunday)
Walter Meyers
27 Lowell Blvd.
J. O. Riley
4284 Hooker St.
Ethel Weber
1158 South York
Wedow Iris Garden
535 South Elm St.
Doris Weith
2167 South Ogden

EADS

Mrs. Hester Conklin
1108 Wansted St. — on Highway 287 between
11th and 12th Streets

FORT COLLINS

Colorado State University
c/o Prof. Carl Jorgensen
Several plantings on campus

FORT MORGAN

Mrs. Dan Edelman
112 Spruce, Log Lane Village
(After 5 p.m. week days; all day Saturday and Sunday)

Mrs. Pete Galassini
South Star Rt.—4½ miles South Sherman Road

Mrs. Harold Lenhardt
Rt. 1, 3½ miles southeast of Fort Morgan,
telephone 867-2068

Mrs. Albert L. Richardson
705 Park St.

Mrs. Russell Spotts
1001 Lake Street

GOLDEN

Mrs. Howard Housley
1425 Normandy Road, Wide Acres — one block west of the Youngfield-Colfax traffic light and one block south of Colfax (After 3 p.m. any day except Tuesday or Saturday. Other times by appointment. Phone 237-1521)

F. S. Luckey
14701 West 72nd — just east of Ralston Road

GRAND JUNCTION

Don MacKendrick
117 Red Mesa Hts.
(Weekdays after 4 p.m.; weekends and holidays in afternoons)

R. A. Paige, D. V. M.
1360 Rood Avenue

GREELEY

Mrs. Bethel Martin
825 16th St. — Iris are in back of studio
(After 9:30 a.m.)

Mrs. June Renfro
1123 Pleasant Acre Drive

HILLROSE

Mrs. Jake Staley
Rt. 1, Box 102

LA JUNTA

Edna E. Gillen
514 San Juan Ave.

LAKEWOOD

Baker's Acre
7650 West 4th Ave.

LITTLETON

Tom Magee
6631 South Hill Way

MAYBELL

Mattie Taylor
North of NW corner of Park on Hwy. 40

NUNN

Mrs. Mable Taylor

PUEBLO

De Haven's
1605 East River St.

STEAMBOAT SPRINGS

Mr. and Mrs. Dave Rankin
346 Third St.

STERLING

Mrs. T. C. Lamoreaux
827 West Main and 820 Douglas St.
Mrs. Fred Tanner
931 West Main

WHEATRIDGE

Donald O. Roos
8101 West 46th Ave.
(After 4 p.m. weekdays; all day Saturday and Sunday)

WRAY

Mrs. W. L. Grutter
202 East 4th

YUMA

Mrs. Elizabeth Moschel
220 South Birch
Carrie Smith
521 West Hoag Ave.



Now where is that darned stamen?

The HOGBACKS in June

M. WALTER PESMAN

ONCE UPON A TIME . . . many years ago . . . there were no Rocky Mountains.

Instead there was . . . well, how far back do you want to go?

You can almost have your choice; for millions of years Colorado and neighboring states were a level plain, much of it in arid desert. Four different times it was wholly or partly an ocean or inland sea, then again a dense, subtropical jungle. Later, came more modern forests.

The birth of the Rockies, some geologists say, occurred about 80 million years ago. However, they won't quibble about a million years more or less.

It wasn't a tame occasion, this blessed event. It did not even happen all in one big explosive convulsion. For many million years there were volcanic eruptions as an aftermath. Yellowstone and some of our local warm springs do not quite know yet that it is time to settle down after the big upheaval.

The result of what happened at the present separations between mountain and plain is particularly interesting to an amateur in geology: it is, what will we say? . . . so evident!

Nice, even layers of placid lake bottoms, where dinosaurs and their kith and kin had been having copious picnics, were later up-ended by internal pressure. Where and when the strain became too great, something had to give: the newly formed sandstone and other formations were cracked, leaving part of the layer cake below, part high in the air, exposing on the up-ended surface the layers in neat chronological order — a regular showcase of geological formations. Thus they appear to

this day, even after much erosion.

To make a very, very long story short, the result is that we have in the neighborhood of Golden for instance, a chance to see the following formations:

1. In the mountains proper, (Look-out Mountain, e.g.) the pre-Cambrian granites, gneisses and metamorphic rocks of the Cryptozoic Eon, over 500 million years old.

2. A laval flow of basalt shows in the North and South Table Mountain.

3. The Morrison Formation of the Jurassic Period of the Mesozoic Era. That is the formation in which the huge dinosaurs are found, some eighty feet long and twenty feet tall.

4. Many formations of the Cretaceous Period (also of the Mesozoic), as illustrated by the Dakota, Benton, Niobrara, Pierre, Fox Hills, Laramie, Arapahoe and Denver Formations. Some more modern fossils are found in these formations, such as present-day trees and shrubs, and also fig, laurel and magnolia. Evidently the climate was both warmer and less arid. Even palmetto is among the fossils in this period.

5. Along the creeks flowing over the plains we find, of course, the recent alluvial formations of the Quaternary Period (Pleistocene Epoch) of the Cenozoic Era.

All of this merely means that our hogbacks are not only a most picturesque landscape of the Rockies, but are veritable museums of geology and fossil study — as well as a flower garden in spring and early summer. It is a wonder so few people have "discovered" them. Hogbacks are choice — especially in June.

Harvard University got its first dino-

saur from the Morrison Formation; the Colorado Museum of Natural History boasts a good collection of these old timers. Dinosaur tracks are visible in a number of the exposed layers of the hogback.

So, all in all, we have a classroom here for geology. But it is much more. The artist finds here a delight for the eye, both in colors and in shapes. Deep red, a chalky-white, brownish-gray, yellows in many shades, even purples show up the various rocks. Lichens add more colors of the rainbow. Finally, the flowers are the crowning glory of this picture of geological background.

To wind up this geological diversion let us give you Webster's definition of a hogback in geology. A hogback is called: "a ridge formed by the outcropping edge of tilted strata; hence, any ridge with a sharp summit and steeply sloping sides". Evidently, we have the real article in our hogbacks at Morrison and Golden.

Now let us turn from inert stone to live plant material. We might take that very region as an illustration. Join me then in a climb up the hogback directly east of the Park of the Red Rocks, famed for its Outdoor Theatre.

It is not an easy climb. The west slope is gentle enough at the bottom, but then presents the jagged break where the outcrop was sharply cracked in its fault. These rocky edges are quite vertical in many spots. The east slope represents the angle of incline. Where the highway was cut through in its gradual east ascent, these rock slopes are so smooth and steep it takes good rubber soles to prevent a downward slide — a human lacks the convenient vacuum cups with which a fly is provided.

Even the highway cut through the ridge is little help in climbing the hog-

back from its north. No matter how you tackle these hogbacks, the top is hard to reach. Once there, all is easy.

Now look at the difference between east and west slopes. The forenoon sun is easy on plant growth; it's in the afternoon that the combination of hot atmosphere and direct sun's rays — at right angles — tests a plant's resistance to drought. So, the west slope becomes a semi-desert in midsummer and fall. It's where we might expect to find (and do) *Opuntia*, prickly pear cactus, blooming in the latter part of June.

There is one evergreen tree that can "take it" for it stands long periods of drought, gravelly soil and severe heat. It is *Juniperus scopulorum*, Rocky Mountain juniper, and you find it in quantity on these arid west slopes. They do not occur in dense groups: each tree requires a certain area from which to derive its moisture, so it does not tolerate a competitor within close range.

A number of these die-hards are bearing the scars of their rugged existence. They are like midgets with heavy body and chunky limbs. There may be dead branches, there may be gnarled growth — still the tree lives on. One old veteran, on being cut down, was found to have started life at the very time Columbus discovered America, as shown by the rings in the wood. It had been attacked by borers, one side had died after 100 hundred years of life and, finally, but one little branch survived to add the last annual rings to the venerable old trunk.

Few, if any, of these junipers are found on the east slope where the major growth consists of *Pinus ponderosus*, ponderosa pine; *Cercocarpus montanus*, mountain mahogany; *Quercus gambeli*, the luscious oakbrush, and others. This oak growth, in fact, gives a shiny-green effect to both sides of

the hogback.

Ribes, cereum, wax currant, with its more-or-less insipid red fruit and small currant leaves, occurs on both slopes — as it does all over the foothills. You can easily recognize it by its strong, almost musky, currant odor when it is crushed. (No, no, I don't mean that skunklike smell which comes from breaking a twig of that three-leaved shrub on the east slope and properly called skunkbush, *Rhus tribo-lata*; its sticky fruit is still yellow in June while the currants have already turned red.)

"I don't think much of your old, dry hogback with nothing but green leaves and musty-tasting currants. I like flowers — lots of them." That was my little five-year-old who did not see it until the beginning of July.

"Well, Nancy, you should have been here in June — early June, in fact. You could have seen hundreds of *Thlaspi glaucum*, white candytuft; fields of *Lesquerella montana*, yellow bladderpods; and *Physaria didymocarpa*, twinpods, that are now still noticeable by their neat rosettes of leaves.

"A little later the color changes to blue, with lots of *Penstemon virens*, low beard-tongue, and you can still observe on the west slope meadow the last of the *Delphinium nelsoni*, larkspur, with its deeply cut leaves and upright stalks of spurred flowers. There were thousands of them just a few weeks ago."

"What are those beautiful white cups that play peek-a-boo with the shrubs? Oh, I like them, I thought they were butterflies a first." Thus, Nancy again.

"Not so bad. They are called butterflies, only by the Spanish name *Mariposa*. Look at the inside of the cup and see the beautiful greenish-purple, velvety band at the bottom."

Nancy was not looking too carefully or she would have noticed a number of

other flowers: *Campanula petiolata*, harebell; *Helianthus pumilus*, perennial sunflower; *Tradescantia occidentalis*, blue spiderwort; and *Eriogonum umbellatum*, sulfur flower. Even some remnants of *Sedum stonepetalum*, yellow stonecrop, and *Townsendia excapa*, Easter daisy, are still evident in the beginning of July. But they are making a real splurge in early June. Among the earliest to appear is *Mahonia repens*, Oregon grape, a fragrant yellow flower that later turns to dark-purple berries, hidden among the holly-like leaves. (Incidentally, they make delicious jelly if you take the time and make the effort to gather them.)

Professor B. O. Longyear, in his *Rocky Mountain Wildflower Studies*, pictures a contrast between two men on a holiday in the hills: "One came back with a blister on each heel and some cactus pricklers in one hand. He had felt the heat of the sun — his collar was wilted — he had seen only rocks and trees and brush."

"The other came back with memories of bird-notes, flower blossoms, sculptured rocks, of a sunset changing from yellow to red, from red to a fading purple haze and with an appreciation of nature's kinship to man."

As you spend a June day among our rugged hogbacks, as you look over the plains to the east, the valley panorama to the south, and as you are awed by the grandeur of the Red Rocks and the snow mountains to the west — you can't help but feel that kinship. Time becomes a very relative thing, measured by the geological aeons of rock formation, the centuries of tree growth, the fleeting flower blossom and the changing cloud that passes over you.

Man needs to be alert to Nature's pageantry of beauty — he needs to be made aware of the relatively small place he fills in the universe.

PLANT OF THE MONTH...

Boettcher Conservatory

PEG HAYWARD

HAVE YOU SEEN the bananas growing in the Conservatory of Denver Botanic Gardens? *Musa sapientum*, the plant which provides us with the luscious fruits, is one of the strangest and most interesting of all plants.

Bananas are not trees but perennial herbs. Unlike most plants each stalk bears only one bunch of fruit and then dies. When the old stalk has been cut off, new shoots come up from the base of the plant to form new plants. The most remarkable feature of the banana is its rapid growth. For its size it is the speediest growing of all known plants. Within twelve to eighteen months the tender green shoot will develop into a plant fifteen or twenty feet in height, with a crown of immense leaves five to ten feet long and two feet wide, and will bear a huge bunch of fruit weighing as much as a hundred pounds. The secret of this rapid growth lies in the fact that the stalk of the banana does not have a true trunk but is composed of leaf-sheaths rolled tightly together to form the stalk, with the blades of the leaves spreading from the tops of the sheaths. The blade of a banana leaf has a stout midrib and many closely parallel veins running almost at right angles to the midrib. There are no cross-veins, and it is easy to tear the blade between any two veins. Such tearing occurs, as the leaf is blown about by the wind.



The flower cluster of the banana is as surprising as the plant itself. After the plant has produced all its leaves, the top of the stem forms the inflorescence, which forces its way up the center of the stalk. When the inflorescence appears, it is entirely enclosed by large overlapping, purplish bracts. This mass of bracts is at the end of a stout green stem which gradually bends over from the weight so that the tip of the inflorescence points downward. The bracts are arranged spirally, each bract in turn rolls backwards and exposes half-whorls of small, yellow, tubular flowers. The upper ones develop into bananas, the lower ones furnish pollen, the middle ones drop off. Bananas grow with their tips up, the reverse of the way we see them hanging in fruit markets.

Other striking tropical plants belonging to the *Musaceae* family which may be observed in the conservatory are *Ravenala madagascariensis*, traveler's tree; *Strelitzia reginae*, bird of paradise; *Strelitzia nicolai*, white bird of paradise; and several species of *Heliconia* and of the ornamental flowering bananas. All of these banana-like plants have large paddle-shaped leaves and exotic blossoms which never cease to thrill conservatory visitors.

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A Non-Profit Organization

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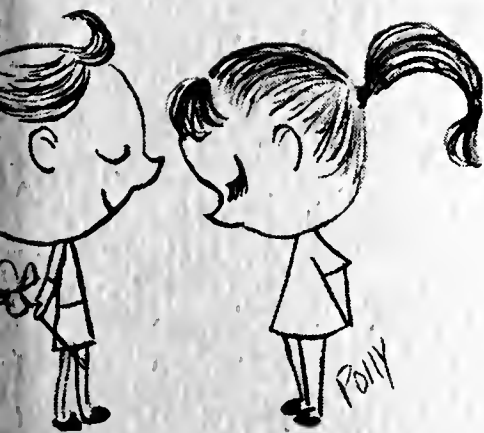


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The Green Thumb

DENVER BOTANIC GARDENS
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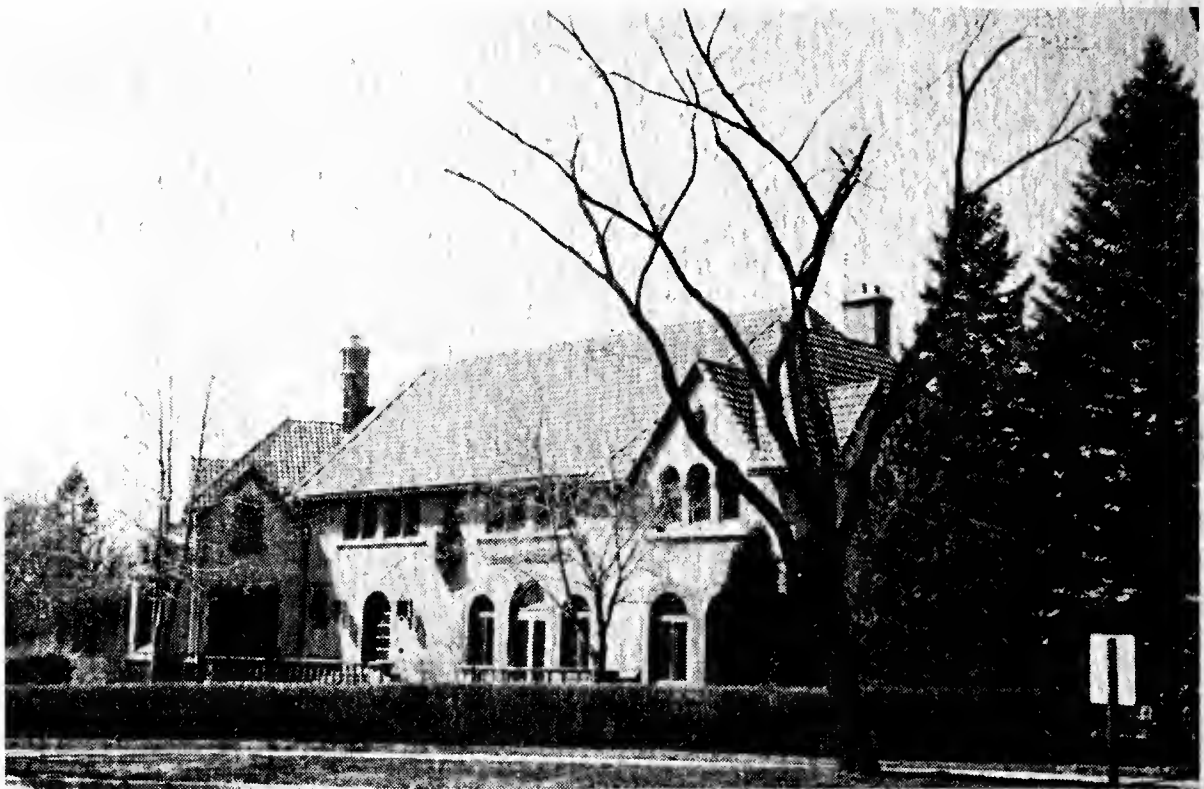
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DENVER BOTANIC GARDENS

DENVER, COLORADO

This is a non-profit organization supported by municipal and private funds.

A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

JULY-AUGUST 1967



THE COVER

Pleated Gladiolus

1967 Introductions "Lovely" and "Improvisation"

Arrangement by Lee Ashley. Photograph by Mrs. William Wood

THE GREEN THUMB

VOLUME TWENTY-FOUR, NUMBER FOUR

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The Green Thumb

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HELEN M. VINCENT, *Editor*

JULY - AUGUST 1967

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to the Membership Chairman, Mrs. William Stanley, 3800 East Long Road, Littleton, Colorado 80120 or call 771-3617.

PLANT OF THE MONTH...

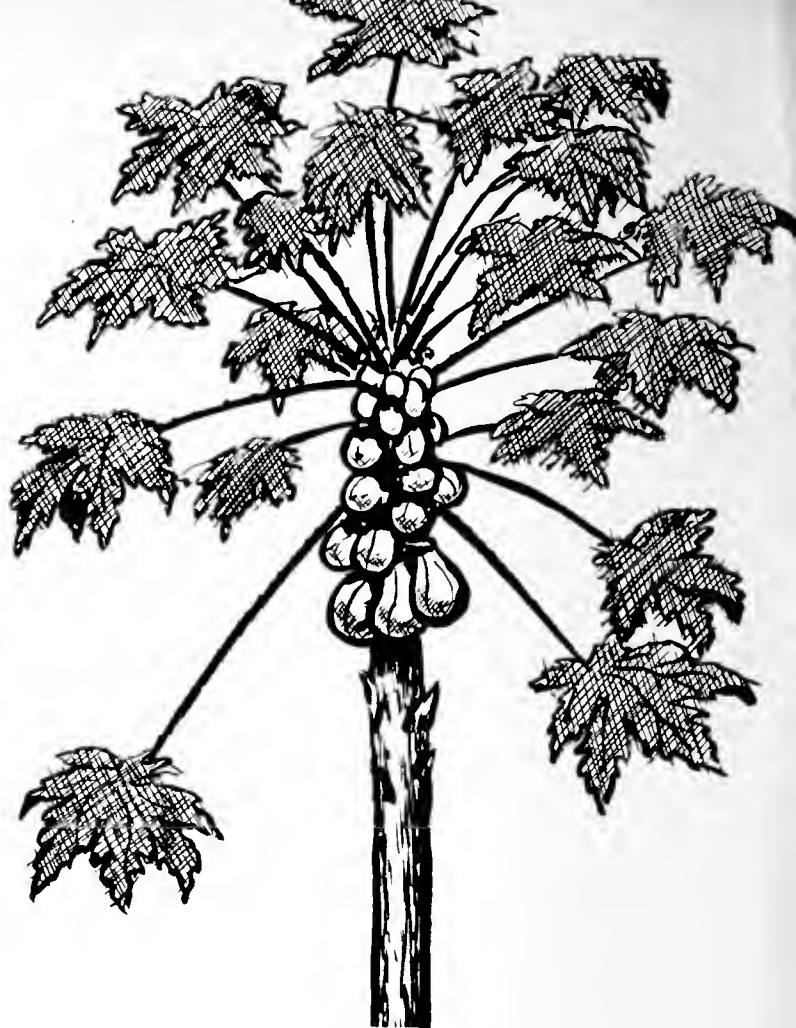
Boettcher Conservatory

PEG HAYWARD

Carica papaya, commonly called melon tree, is one of the interesting fruit producing trees in the conservatory of Denver Botanic Gardens. This herbaceous plant is fascinating not only for its unusual structure and odd melon-like fruit but because of its many uses.

The papaya, native of tropical America, is the most important member of the small family *Caricaceae*. The generic name *Carica* comes from Caria, an ancient country of S. W. Asia Minor. The leaf of the papaya was thought to look like that of *Ficus carica*, the common fig.

Papaya is a fast growing, short-lived, unbranched, evergreen tree, which rarely exceeds 20 feet in height. The hollow trunk is straight with a dingy, grayish-brown coloring and prominently marked with broad to nearly-horizontal leaf scars. Deeply-lobed leaves with sharp points are clustered at the top of the trunk, the upper leaves being erect and spreading and the lower leaves drooping. The leaves, diverging from hollow-stemmed stalks, are 1½ to 2 feet wide and are dark green with lighter underside and distinctly veined. Small, yellowish-white, male flowers are borne in clusters and solitary, five-petaled, female blossoms about 1 inch wide and creamy-white with a yellow center are borne in the new leaf axils.



Carica papaya

When fully open, tiny, pale-green embryonic fruit can be seen in the center of the flower. Several to many short-stalked fruits are attached directly to the trunk. The melon-like fruits turn from green to orange at maturity and may weigh from 1 to several pounds and vary from 4 to 20 inches long. The fruits are produced continuously for 10 to 18 months from the time the first ones mature.

The esteemed fruit is served as fruit or made into pickles, preserves and sherbets. Green papayas can be cooked as a vegetable like squash. There are many uses for the orange, sweet, juicy pulp. The juice contains papain, a digestive enzyme tapped from the green fruit and dried. Papain from the papaya is used commercially in the manufacture of meat tenderizers. The fruit is used in making face creams, especially for removing freckles. It has been reported that the leaves are used as soap.

The papaya, a most unusual tree, may be seen with its flowers and fruits during the next few months in the conservatory.

COLORADO PLEATED

Gladiolus

LEE J. ASHLEY
*President Colorado
Gladiolus Society*

GLADIOLUS in some form have probably existed since the beginning of time. Unfortunately, we are unable to trace them back beyond 400 B.C. because the ancients included the gladiolus in a group with several other bulbous flowers, giving the entire group a common name. In Hebrew it was sushan; in Arabic, susan; in pure Latin, cypiros. The more popular term, gladiolus, was used by the Greeks and Romans.

Many men have added to the beauty of the gladiolus, each hybridizer contributing, through his love, a new color, an added ruffle or, perhaps, increased vigor. Many species have been blended to create the modern glad.

Here in Colorado at Denver Botanic Gardens we have been doing considerable hybridizing, trying to create a new race of glads in clean, clear colors, with extra heavy texture and intense ruffling. After many years of work we have produced a line of gladiolus that the public has named for us. Each year Mrs. William Wood and I have exhibited some of our seedlings at the flower shows around Denver and someone always asks: "How did you get the pleats on them?" or "I have never seen pleated glads before."

The story of our pleated glads is interesting and involves hundreds of hours of hard work, each spring planting thousands of seedlings, keeping records of each corm, and digging all of them in the fall. Each of these steps take us the entire season.

Hybridizing the gladiolus is easy: the pollen is simply taken from one floret and placed on the stigma of another, the seed pod is allowed to ripen, stored until spring and then planted. Each seed will produce a new hybrid different from all others — but the percentage of superior varieties is very small; so one must grow hundreds to get a few that are worthy to introduce.

In order to make crosses that would produce better seedlings with the traits we were looking for, many hours were spent searching through catalogs, parentage lists and charts to track down the characteristics that we wished to enhance and also those of the ones which have proved to be healthy and to have strong growing habits. Through research we were able to find which varieties would transmit heavy texture, ruffling and clean colors. By crossing many of these we have produced numerous seedlings that have the traits we are striving for. Perhaps the hardest job of all is going up and down the rows and roguing out the ones that do not measure up—one will have a beautiful color but may lack bud count; another will have heavy ruffling but the color is not clear — yet each one is the product of the magic that God has helped you to create, making it something unique and therefore valuable in your own eyes. Every now and again one will show up that is superior in many ways — these we tag, and keep many records regarding number of buds, height, size, how many blossoms open,

date of bloom, awards if any, and type of florets, leaves, stems, etc. After about five to seven years it will have increased enough to introduce — if still of superior quality.

Do come out to the York Street Unit of Denver Botanic Gardens and look at the many different faces on these —

our new glads — see, also, most of the new ones from other hybridizers. Plan to attend the annual Colorado Gladiolus Shows, Sunday, August 6, in Greeley, Colorado and Saturday, August 12 at Bear Valley Shopping Center, Denver. Look for the seedling tables where you will find our pleated glads.

ANNUAL MESSAGE:

FROM THE OFFICE OF THE PRESIDENT

TO: ALL PLANT SALE VOLUNTEERS

Our wonderful volunteer friends have done it again — made the Annual Plant Sale a tremendous success, despite the caprices of nature in an attempt to dampen our enthusiasm with furious blasts of wind, rain, snow and low, low temperatures.

It would be foolhardy for us to say that you all worked harder and longer hours than ever before, because you just can't go higher than the summit. But the fact that is amazing is that year after year you return with the same determined ambition to make a success of this event for the benefit of Denver Botanic Gardens. Despite all the vagaries and disappointments encountered, your contagious spirit of optimism is felt by all who are in any manner connected with the Gardens.

The only reward you receive for your efforts is a most sincere THANK YOU from those of us who are at the helm of our organization. However, each of you, in your own way, has the satisfaction of knowing that, no matter how large or small was your participation, you did the best job you could possibly do and so contributed to the success of the sale.

We do not have a final net figure on the dollar volume of business, but the gross amount was \$13,000, which is rather staggering for a two-day sale conducted by an army made up almost entirely of volunteers. Denver Botanic Gardens derives great benefit from these proceeds and probably even more from the goodwill engendered by you and from the publicity we received, not only in this area, but throughout the entire country.

This, then, is a message of sincere appreciation to each and every one of you — from the chairmen who engineered the operation, those who procured the abundance of plant materials, the sales people, those in the background who helped to weld the show together down to the very last volunteers who came from the public schools to work.

THIS WAS A JOB WELL DONE!

*Elna Gibson, General Chairman
Plant Sale Committee*

**LAWRENCE A. LONG,
*President, Board of Trustees***

Checklist of Flowers—

THE MT. GOLIATH ALPINE UNIT

DR. HELEN MARSH ZEINER

THE M. WALTER PESMAN trail in the Mt. Goliath Alpine Unit of the Denver Botanic Gardens is an excellent place to see alpine and subalpine wild flowers.

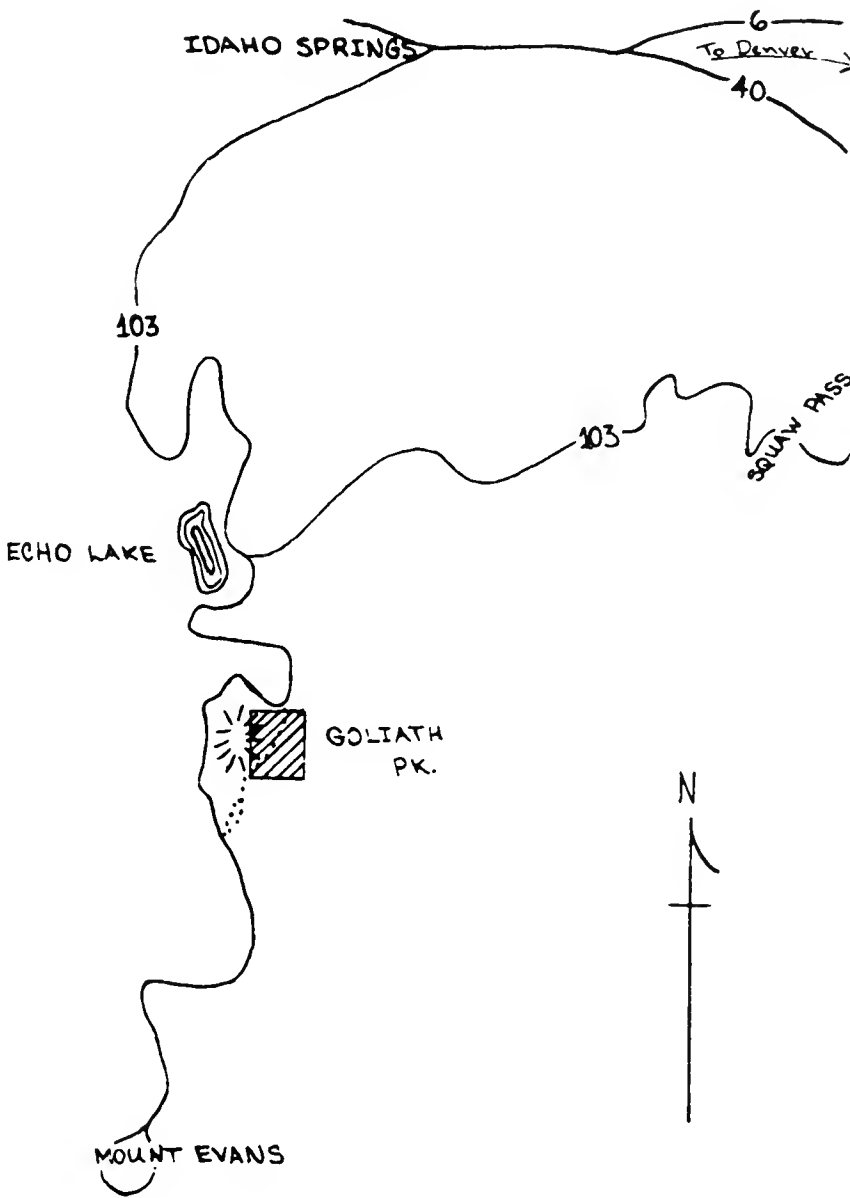
The Mt. Goliath Unit, in the Arapaho national forest, is a joint project between the Denver Botanic Gardens and the U. S. Forest Service. It is located on the Mt. Evans road, just five miles beyond Echo Lake, on Colorado highway 103. It is easily reached from either Idaho Springs or Bergen Park and Squaw Pass.

The trail has two parts — a short loop trail above timberline for those who lack the time or strength for a long walk at high altitude, and the main trail which is about a mile and a half long and passes through both alpine and subalpine zones at altitudes of 11,000 to 10,500 feet.

Many dedicated volunteer workers have contributed hours of time to the development and maintenance of the trail.

This checklist of plants is only a partial list which includes some of the most frequently seen or most obvious plants. It has been modified from *A Checklist of Flowers Commonly Found Along or Near the M. Walter Pesman Alpine-Subalpine Trail, Mt. Goliath*, prepared in 1966 by Dr. E. H. Brunquist for the Denver Museum of Natural History and the Denver Botanic Gardens.

Descriptions of the flowers are not included. Instead, page references to *Meet the Natives* by M. Walter Pesman are given. Adequate descriptions will be found in this most useful book for the amateur.



Queen's Crown



King's Crown



Alpine Phlox

White, Creamy-white, Greenish-white, or very delicately tinted flowers

Name	Family	Page Reference
<i>Polygonum bistortoides</i>	<i>Polygonaceae</i>	p. 27
Bistort	Buckwheat	
<i>Eriogonum subalpinum</i>	<i>Polygonaceae</i>	p. 53
Subalpine Buckwheat	Buckwheat	
<i>Cerastium arvense</i>	<i>Caryophyllaceae</i>	p. 26
Chickweed	Pink	
<i>Arenaria obtusiloba</i>	<i>Caryophyllaceae</i>	p. 26
Sandwort	Pink	
<i>Paronychia pulvinata</i>	<i>Caryophyllaceae</i>	p. 27
Nailwort, Whitlow-wort	Pink	
<i>Caltha leptosepala</i>	<i>Ranunculaceae</i>	p. 26
Marsh Marigold	Buttercup	
<i>Androsace carinata</i>	<i>Primulaceae</i>	p. 26
Rock Jasmine	Primrose	
<i>Androsace septentrionalis</i>	<i>Primulaceae</i>	p. 26
Rock Primrose	Primrose	
<i>Saxifraga bronchialis</i>	<i>Saxifragaceae</i>	p. 50
Dotted Saxifrage	Saxifrage	
<i>Saxifraga rhomboidea</i>	<i>Saxifragaceae</i>	p. 50
Snowball Saxifrage	Saxifrage	
<i>Heuchera parvifolia</i>	<i>Saxifragaceae</i>	p. 42
Alumroot	Saxifrage	
<i>Ribes montigenum</i>	<i>Saxifragaceae</i>	p. 19
Prickly Currant	Saxifrage	
<i>Claytonia megarrhiza</i>	<i>Portulacaceae</i>	p. 24
Big-rooted Spring Beauty	Purslane	
<i>Lloydia serotina</i>	<i>Liliaceae</i>	p. 26
Alpine Lily	Lily	
<i>Zygadenus elegans</i>	<i>Liliaceae</i>	p. 52
Wand Lily	Lily	
<i>Pedicularis parryi</i>	<i>Scrophulariaceae</i>	p. 27
Parry Lousewort	Figwort	
<i>Phlox caespitosa</i>	<i>Polemoniaceae</i>	p. 26
Alpine Phlox	Phlox	
<i>Arabis drummondii</i>	<i>Cruciferae</i>	p. 50
Rock Cress	Mustard	
<i>Cirsium hookerianum</i>	<i>Compositae</i>	p. 27
Wooly Thistle	Daisy	
<i>Antennaria</i> spp.	<i>Compositae</i>	p. 27
Pussytoes, Catspaw	Daisy	
<i>Achillea lanulosa</i>	<i>Compositae</i>	p. 27
Yarrow	Daisy	



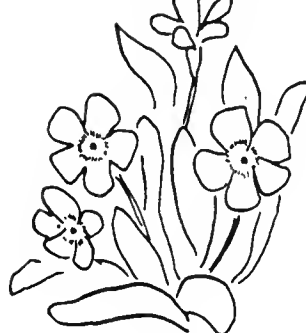
Rock Cress



Pussytoes



Twisted-pod Draba



Fairy Primrose

Yellow Flowers

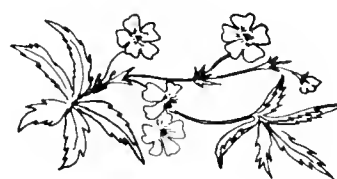
Name	Family	Page Reference
<i>Geum turbinatum</i>	<i>Rosaceae</i>	p. 33
Alpine Avens	Rose	
<i>Potentilla</i> spp.	<i>Rosaceae</i>	p. 33
Cinquefoil	Rose	
<i>Hymenoxys grandiflora</i>	<i>Compositae</i>	p. 34
Old Man of the Mountain, Alpine Goldflower	Daisy	
<i>Hymenoxys acaulis</i>	<i>Compositae</i>	p. 33
Woolly Actinenella	Daisy	
<i>Haplopappus pygmaeus</i>	<i>Compositae</i>	p. 34
Pygmy Haplopappus	Daisy	
<i>Senecio</i> spp.	<i>Compositae</i>	p. 34
Senecio	Daisy	
<i>Castilleja occidentalis</i>	<i>Scrophulariaceae</i>	p. 34
Yellow Paintbrush	Figwort	
<i>Oreoxis</i> spp.	<i>Umbelliferae</i>	p. 33
Alpine Parsley	Carrot	
<i>Saxifraga flagellaris</i>	<i>Saxifragaceae</i>	p. 34
Whiplash Saxifrage	Saxifrage	
<i>Sedum stenopetalum</i>	<i>Crassulaceae</i>	p. 33
Yellow Stonecrop	Orpine	
<i>Eriogonum flavum</i>	<i>Polygonaceae</i>	p. 34
Sulphur Flower	Buckwheat	
<i>Draba</i> spp.	<i>Cruciferae</i>	pp. 34, 62
Draba	Mustard	

Pink, Rose, or Rose-purple Flowers

<i>Trifolium</i> spp.	<i>Leguminosae</i>	pp. 23, 46
Clover	Pea	
<i>Primula angustifolia</i>	<i>Primulaceae</i>	p. 23
Fairy Primrose	Primrose	
<i>Sedum integrifolium</i>	<i>Crassulaceae</i>	p. 23
King's Crown	Orpine	
<i>Sedum rhodanthum</i>	<i>Crassulaceae</i>	p. 23
Queen's Crown	Orpine	
<i>Silene acaulis</i>	<i>Caryophyllaceae</i>	p. 23
Moss Campion	Pink	
<i>Pedicularis groenlandica</i>	<i>Scrophulariaceae</i>	p. 45
Little Red Elephant	Figwort	
<i>Castilleja rhexifolia</i>	<i>Scrophulariaceae</i>	p. 24
Rosy Paintbrush	Figwort	
<i>Epilobium latifolium</i>	<i>Onagraceae</i>	p. 47
Fireweed	Evening Primrose	
<i>Erysimum wheeleri</i>	<i>Cruciferae</i>	p. 23
Wheeler's Wallflower	Mustard	



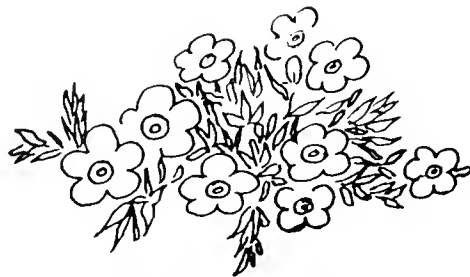
Moss Campion



Potentilla divers.

Blue, Violet, or Purple Flowers

Name	Family	Page Reference
<i>Polemonium delicatum</i>	<i>Polemoniaceae</i>	p. 29
Jacob's Ladder	Phlox	
<i>Polemonium viscosum</i>	<i>Polemoniaceae</i>	p. 29
Sky Pilot	Phlox	
<i>Phacelia sericeae</i>	<i>Hydrophyllaceae</i>	p. 29
Purple Fringe, Pincushion	Waterleaf	
<i>Mertensia spp.</i>	<i>Boraginaceae</i>	p. 29
Chiming Bells	Borage	
<i>Eritrichium elongatum</i>	<i>Boraginaceae</i>	p. 29
Forget-me-not	Borage	
<i>Campanula uniflora</i>	<i>Campanulaceae</i>	p. 30
Alpine Harebell	Bellflower	
<i>Erigeron spp.</i>	<i>Compositae</i>	pp. 30, 56
Daisy	Daisy	
<i>Aquilegia spp.</i>	<i>Ranunculaceae</i>	p. 29
Columbine	Buttercup	



Alpine Forget-Me-Not

THE

Lichens

-
- DR. WILLIAM A. WEBER
- *Curator of the Herbarium*
- *University of Colorado*
-

THE black, gray or brightly colored blotches on the rocks are lichens. Lichens are not really a special kind of plant like mosses or liverworts, but are a remarkable example of a way of life — symbiosis — in which a green plant, in this case an alga, is parasitized by a fungus. The two plants not only live together as if they were one, but they form a unique plant structure which is different from anything either plant could make by itself. Simply stated, the fungus forms a body superficially organized like a leaf. The algal cells lie just under the surface in the position occupied by the palisade cells of a leaf, as if the fungus “cultures” the algae in its “greenhouse.” The algae make food and reproduce efficiently, and the fungus draws on the algae cells for its nourishment. Worldwide there are

about 20,000 different lichens. The symbiotic combination is able to colonize substrates like bare rock, where neither the fungus nor the alga could live by itself.

Lichens are active only in humid periods, hence they grow slowly but attain great age. Some you see on Mount Goliath may be older than the oldest bristlecone pines and they are being used to date the rates of recession of glaciers. The lichens of Mount Goliath are types common to the high mountains of both hemispheres, often the same species. Certain lichens have economic values, since they produce antibiotics, dyestuffs, forage for caribou, and perfume bases. They also absorb radioactive fallout and in some areas have become hazardous to humans who eat caribou meat.

Annual Terrace and Garden Tour

MARCIA REHMUS

THE ANNUAL Terrace and Garden Tour, an activity of the Denver Botanic Gardens Guild for the benefit of Denver Botanic Gardens, is scheduled for Thursday, July 27, from 2:00 to 8:00 p.m. In case of rain the tour will be held at the same time on Friday, July 28. This new, later time will give business-men an opportunity to view the eleven outstanding gardens of interest. Located entirely in the Country Club and Crestmoor areas this year, the gardens are easily accessible to one another. Gardening experts will be available in each garden to answer questions about them.

In capsule form, the eleven show gardens are as follows:

Mr. and Mrs. Roger B. Mead — 144 Race Street. A sunny and inviting forty-year-old garden with a working greenhouse.

Mr. and Mrs. Montgomery Dorsey — 177 Race Street. A magnificent "countrified" city garden providing great variety in plantings and landscaping features.

Mrs. Eugene Dines, Sr. — 1953 East Third Avenue. A charming, small townhouse garden designed for minimum maintenance.

Dr. and Mrs. Martin E. Anderson, Jr. — 361 Race street. A delightful Georgetown walking garden combin-

ing trees, shrubbery and brick paths into a pleasing effect.

Mr. and Mrs. E.T.H. Talmadge, Jr. — 275 Vine Street. A strikingly unusual open terrace and conservatory-greenhouse housing azaleas, orchids, gardenias and unusual potted plants highlight this night-lighted garden.

Mr. and Mrs. Dudley Green — One Crestmoor Drive. From an outstanding fieldstone fountain is viewed a large circular garden of roses, annuals and many trees including evergreens.

Mrs. Jeanne Iacino — Three Crestmoor Drive. An intriguing oriental garden featuring low-growing evergreens and bonsai surrounding a small pool and bridge.

Mr. and Mrs. C. L. Hubner — 311 Jasmine Street. An attractive patio opens onto a large, airy, colorful garden of annuals flanked by evergreens.

Mr. and Mrs. Joe K. Miller — 125 Jasmine Street. Cascades of colorful petunias and numerous other annuals, large vegetable beds and torches for night lighting highlight this manicured, owner-maintained garden.

Mr. and Mrs. Thomas W. Payne — 85 Southmoor Drive. A beautifully designed, brick retaining wall provides

a terrace for annuals and perennials and high country plantings including aspen and columbine.

Dr. and Mrs. Paul E. Youmans — 99 Southmoor Drive. A small perennial garden features raised wood-enclosed flower beds and crab apple trees.

Tour tickets (tax deductible) are available at \$3.00 each and Box Supper tickets at \$2.00 each at: 1) The Gift Shop at Denver Botanic Gardens Conservatory, 1005 York Street, telephone: 297-2348; 2) Botanic Gardens House, 909 York Street, telephone: 297-2547; or 3) Through any member of the Denver Botanic Gardens Guild. Tour tickets will also be available at the individual gardens on the day of the tour. Make checks payable to Denver Botanic Gardens.

Bus transportation, at \$1.00 per person, will be available from the conservatory, 1005 York Street, at 2:00, 3:00 and 4.00 p.m. Groups are wel-

come. For reservations call Mrs. Earle Honnen, 781-8601, by Wednesday, July 26. Reservations are recommended and will be held until fifteen minutes before departure time.

Box Suppers (including coffee or cold drink) at \$2.00 each will be served at Botanic Gardens House, 909 York Street, from 5:30 to 7:00 p.m. Tickets must be purchased by Tuesday, July 25.

The 1967 Terrace and Garden Tour Chairmen are: General Chairman, Mrs. William E. Russell; Co-Chairmen: Mrs. Thomas Payne; Box Supper: Mrs. Mackintosh Brown and Garden Club of Denver; Garden Experts: Mrs. Robert L. Davis; Garden Finding Committee: Mrs. Chard P. Smith, Jr.; Mrs. R. L. Davis; Hostesses: Mrs. Donald L. Harlan; Publicity: Mrs. Frederick P. Rehmus; Signs and Supplies: Mrs. James Kilgroe; Tickets: Mrs. Loring Brock; Co-Chairmen: Mrs. Donald P. Anderson, Mrs. Gary Christy; Transportation: Mrs. Earle Honnen.

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DENVER BOTANIC GARDENS
909 York Street, Denver, Colorado 80206

I hereby apply for membership in the Denver Botanic Gardens ☐
I wish my membership in the Denver Botanic Gardens extended ☐

Enclosed is \$_____ for my annual dues.

Class of Membership desired: (check one)

- | | | | |
|--|----------|---|---------|
| <input type="checkbox"/> Regular | \$ 5.00 | <input type="checkbox"/> Supporting | \$25.00 |
| <input type="checkbox"/> Participating | \$10.00 | <input type="checkbox"/> Contributing | \$50.00 |
| <input type="checkbox"/> Sustaining | \$100.00 | | |

Name_____		
Address_____		
City_____	State_____	Zip Code_____

EVERGREENS

FRANCES NOVITT

SOME OF THE trees and shrubs in the Pinetum in City Park were planted along the north wall of the Denver Museum of Natural History because they are foreigners which must be protected from our bright winter sun. Most of them are coniferous evergreens; that is, they keep their leaves or needles all through the year, and bear true cones. Many in this location have done very well and serve to remind us that they are hardy in the Denver region so long as they are protected from the mid-day and afternoon sun, especially in the winter.

The expansion of the Museum of Natural History, taking place this year, includes construction on the north side of the building requiring the removal of some of these evergreens. Last March six specimens were removed to various locations in the Denver Botanic Gardens York Street Unit and most of them are doing well.

Along the south boundary, just west of the Gaylord Street gate, is the Lew Hammer model garden. Between the garden fence and the wall along the property line there are now two firs. One is an *Abies holophylla*, needle (or Manchurian) balsam fir; the other is an *A. concolor pyramidalis*, Hill blue-white fir. The needle fir was planted in City Park in 1957 and is now about 9 feet tall — doing well in its new location. It is native in Manchuria and Korea and hardy in the northeastern United States. The Hill blue-white fir is a variety of the white fir which is native to Colorado and New Mexico.

This specimen was planted in City Park in 1951 and is now about 13 feet tall — also doing well in its new location. Firs are beautiful, large evergreen trees, distinguished from spruces by their flat needles and erect cones.

Just west of the two specimens mentioned is an *Abies balsamea*, balsam fir, a native from Labrador to West Virginia and Iowa. This tree was planted in City Park in 1954 in rather poor condition but has grown and filled out over the years, so that it is now 18 to 20 feet tall and putting out fine new growth in its new location.

Near the northeast corner of the conservatory building is a *Chamaecyparis nootkatensis*, Nootka cypress. In its native home, the west coast from Alaska to Oregon, it becomes a tall tree; here it may eventually reach 35 feet. the genus *Chamaecyparis*, or false cypress, has opposite scale-like leaves which occur in pairs at right angles to each other on the twig, and a round, woody cone, which distinguishes it from the arborvitae or *Thuja*.

The late Robert E. More, in "Evergreen Rembrandts for the Rocky Mountains," (*Green Thumb*, April, 1958) wrote ". . . Graceful, slightly drooping, frosted foliage and perfect symmetry and form make it unique. Besides having a spectacular beauty, it is completely hardy." This particular specimen was only 13 inches tall when it was planted in City Park in 1955. It is now 10 feet high. Unfortunately, in spite of careful transplanting, it does not seem to be putting on any new

growth in its new location and may not survive the move.

Farther west along the north wall of the conservatory-greenhouse complex there are two small *Thuja orientalis conspicua*, goldspire arborvitae, 3 feet high and 3½ feet high, which are doing well, both putting on new growth of a typical golden yellow. Arborvitae are native in China and Korea, as well

as in the eastern United States and Canada. They have frond-like branchlets, scale-like leaves, or needle-shaped when young, and erect, ovoid-oblong, small cones with few scales. There are many dwarf garden forms, prized for their slow, compact growth. Many of the oriental arborvitae seem well suited to our dry climate if provided with shade.

MEET THE NATIVES, by M. WALTER PESMAN

Reviewed by Dr. Helen Marsh Zeiner

SINCE its publication in 1942, *Meet the Natives* by the late M. Walter Pesman has proved to be a very popular and very useful book for the amateur who wishes to identify common native plants. Tourists interested in plants will find this an easy way to "meet the natives."

The 7th edition, revised and published by Denver Botanic Gardens, is now available.

Revisions were made by a committee composed of Dr. Helen M. Zeiner, Dr. Moras L. Shubert, and Dr. Aubrey C. Hildreth. The changes made were mainly those necessary to update the botanical names of plants and to improve and shorten the index by eliminating obsolete plant names which had been carried along in the index as duplicate names.

The text of the book was changed as little as possible, so that it remains as originally written by Mr. Pesman.

Over 700 herbaceous plants, shrubs, and trees frequently seen in Colorado and adjacent Rocky Mountain states are described in the book. Photographs and line drawings of many of these plants are included.

For those not familiar with *Meet the Natives*, this book uses the scheme of arranging plants within altitudinal zones. Within the zones, the plants are

grouped by color. Colored page margins make it easy to locate plant groupings. Season of bloom is listed for nearly all plants included.

Detailed instructions for use of the book will be found in *Meet the Natives*. However, to briefly illustrate how the system works, assume you wish to identify a yellow flower found by the roadside. First turn to the life zone for the altitude where you found the flower. A section which lists the elevation of towns, peaks, passes, and parks will help you if you are not sure of the altitude. Then turn to the yellow-margined pages for this life zone. Look at the illustrations and read the descriptions until you arrive at a suitable identification.

If you wish to carry the identification further, it is easy to later check the plant in a more technical manual. A number of these are listed in *Meet the Natives*.

Meet the Natives includes sections on the meaning of scientific names and of some commonly used technical terms. There are sections on common weeds, vines, and waterplants.

The size of the book makes it convenient to carry in the field. It is spiral bound, with a heavy paper cover which has a glossy finish to resist soil.

Clockwatchers Among Plants



How Rocky Mountain Wild Flowers Tell the Time of Day

M. WALTER PESMAN

*"But I know there is a lot of blue flax here;
I saw it with my own eyes just yesterday morning!"*

The time was four o'clock in the afternoon; only after diligent search did we manage to find the neat little seedballs and the slender stalks of the flax that had been so conspicuous with their blue flowers in the forenoon. *Linum lewisii*, blue flax, is merely one of the flowers that are open in the morning but not in evidence after two o'clock, or thereabout. In this case it drops its petals which dry up quickly thereafter.

Tradescantia occidentalis, spider-

wort, is another blue flower that plays hide-and-seek in the afternoon. Conspicuous as it is with its three petals, ranging from a deep blue to a reddish-purple, you can only recognize it in the afternoon by its floppy, grass-green leaves. Of course, if you break its stem, there is no mistaking its slimy sap that draws out in strings from both broken edges.

As if blue were the trademark for these early morning lovers, there is still another, *Cichorium intybus*, the com-

mon chickweed, that found its way here from Europe. It is a beautiful immigrant showing hundreds of light-blue star flowers in the forenoon. Like the dandelion, it has nothing but strap flowers, lacking the central heart of the sunflower type of composite. The fact is that it has given its name to the entire tribe of *Cichoriae*, which can be recognized by having strap flowers only and milky sap. (Also, these are called ray flowers). From Europe it brought its habit of going to sleep around eleven o'clock not to open again until the next day. I wish I knew whether it makes up for this afternoon nap by opening very early in the morning, but I have never checked its early rising.

About the same time in the forenoon, *Tragopon porrifolius*, the oysterplant (also called salsify) closes. It belongs to the same chicory group with strap flowers and milky sap, but comes in either yellow or violet-purple. It is the plant that later on displays the baseball-sized, beautiful seedball, like a huge dandelion puff. Yes, it also comes from Europe; there, as here, it is cultivated for its root which furnishes the good vegetable oysterplant.

Morning glories and water lilies have a similar habit of calling it a day before the sun gets to the south. A good deal of scientific observation is desirable to find out just what makes the mechanism function. Light intensity seems to be one of the factors involved; perhaps temperature plays a role even though the main mechanism seems to be a periodicity that the plant inherits in its seed. Without using such a big word, what the plant scientists mean is merely that light, temperature, or other factors may have something to do with it, and may make a minor change, but you can't stop a regular plant habit. Perhaps we should not say that hell and



Spiderwort

high water can't do it but rather cloudy heavens and rainy weather.

Just the opposite daily habit is indulged in by such flowers as *Mentzelia*, evening star flowers, and by many evening primroses (members of the *Onagraceae* family). Many of them are night bloomers, opening up at five or six o'clock in the evening, and closing some time in the forenoon. Appropriately enough, they are all a dazzling white or bright yellow, easily seen in subdued light.

It is an exciting experience, watching, for instance, the blossoms of an upright, yellow evening primrose unfolding in the evening. They open so suddenly, they almost "pop". Very shortly thereafter the evening moths come visiting them, some of which are a gorgeous color themselves.

Unforgettable in my memory is an experience with *Mentzelia decapetala* the large, beautiful evening star. I had picked a sturdy stalk topped by a number of large buds. There were many of them around the city of Pueblo. Mainly to keep them from wilting, I had put them in my hotel washbowl, then forgot about them. At seven-thirty I suddenly became aware of a delightful fragrance pervading my room. There,

in the washbowl, three of these gorgeous, ten-petaled blossoms had opened — as striking a sight as any night-blooming cactus. They were easily 4 to 5 inches in diameter and of a satiny white.

Other evening star flowers are yellow and open around five o'clock in the afternoon; whole mountain sides may be transformed by them at that time.

How easy and tempting it is to jump at conclusions. Seeing a flower open in the evening makes us think it is a night bloomer depending upon night flying insects, such as a sphinx moth, to be pollinated. The common, white evening star flower seemed to be an illustration.

Since I had been charmed by its royal brother, *Mentzelia decapetala*, the large evening star flower, which had opened in my hotel room, I took it for granted that *Mentzelia nuda*, the common evening star flower, would be a regular night-bloomer.

So, I took a branch of opening buds to serve as a table decoration for supper. It was beautiful — opening around five o'clock. But at eight o'clock we noticed that it had gone back to sleep. We sympathized with it, thinking that the strong lamplight had fooled it into thinking (does a flower think?) that day had come. We took it back into the outside darkness, hoping the flowers would re-open. It did not work.

Then followed a series of scientific experiments. Before long we found that a cut branch was undependable, especially if placed in unnatural surroundings. There was nothing to do but watch a plant in the open in its natural setting.

The first part of the experiment was not difficult: flowers opened up regularly between five and five-twenty p.m.

Bees came to visit them on their late evening flights — a lot of bees.

Then came the question: what would pollinate them during night-time? The first nightwatch was a failure; it rained. Something went wrong the second night; we could not find the plants in the dark. The third time made us wonder. At nine o'clock there were no open flowers. Had we misjudged the buds that afternoon? More night visits. At last we had to admit that *Mentzelia nuda's* night life is a very short one (happy, we hope). Opening at five, the blossoms show their full beauty for only a few hours; around seven-thirty shop is closed and any flowers that have had no visitors must wait until the next evening. Our first observation in the lamplight was the correct one and, evidently, artificial light was not the contributing factor we had imagined.

It seems that, in this case at least, the flower acts upon a rhythmical impulse, rather than upon a certain intensity of light or a certain temperature, as might be imagined.

Much information needs to be gath-



Morning Glory

ered about the different evening primroses and their day-and-night habits. Some are called morning primroses — are they merely late closers or do they, perhaps, open so late in the evening that we overlook them? One of these is the striking *Pachylopus macroglottis*, fragrant morning, of the foothills certain to attract attention on east or south slopes in early forenoon. Their four white petals gradually turn from a brilliant white to an interesting pink as the morning progresses. Finally, nothing but a reddish-pink spot remains nestled among the rosette of the dark green leaves.

Acquiring this reddish tinge upon wilting seems to be a common habit with this flower. Where the foundation is a bright yellow, as is the case with *Lavauxia brachycarpa*, golden evening primrose, the resulting color is apt to be a striking orange. It draws great attention where it grows in the plains and foothills. A similar orange “wilting color” is found in its more delicate cousin *Galpinsia lavandulaefolia*, puckered sundrops, another member of the evening primrose family.

Morning glories may not only tell the time of day but are so outspoken about it, that people have attached the



Evening Primrose

habit to the name. (Incidentally, that pink wilting color occurs with them as well).

Four o'clocks proclaim their afternoon habits by their name. There is a whole family of them; even the botanical name, *Nyctaginaceae*, has incorporated the Greek word *nyctos* (night) in reference to their nocturnal habits. Most of them, if not all, bloom from the afternoon until morning only. You can almost set the clock by their regularity.

A "flower clock"? Yes, that is just what our old, old friend Linnaeus, the Swedish botanist, outlined, and what William Bartram of the Schuylkill River Garden studied out, and what Dr. John McFarlane, Professor of Botany at the University of Pennsylvania, describes. Here are some of Dr. McFarlane's "Clock-marks":

Midnight to two-thirty a.m.—Night-blooming cereus in full glory.

Three a.m. — Amazon water lily is open.

Four-thirty a.m. — Virginia spiderwort is unfolding.

Five a.m. — Purple morning-glory opens; so does wild rose, Iceland poppy and blue chicory.

Five-twenty a.m. — Common blue flax is "fully unscrewed."

Six to seven a.m. — European water lily unfolds.

Seven to eight a.m. — Texas water lily, orange-red daylily, purple looking glass, yellow wall lettuce from Europe — all join the procession.

Eight to nine a.m. — Scarlet pimpernel, portulaca, marigold follow.

Nine to ten a.m. — Purslane, veronica, cinquefoil, Mexican water lily start blooming. At ten o'clock most water lilies are in full glory, excepting

Zanzibar lily, which opens toward noon.

Ten-thirty a.m. — Bengal crimson water lily closes.

Twelve noon to four p.m. — Successive closing of water lilies, sow-thistle, potato, blue chicory, dandelion, California poppy, red hawkweed, purple pimpernel, finishing up with portulaca, bluebell and pink.

Seven p.m. — Grand show of many evening and night-blooming flowers opening.

Thus Dr. McFarlane. The idea, therefore, of flowers telling the time of day is not new. But we, in the Rocky Mountain region, have a challenge to add our local information to that of Sweden and Quakerland. We can be pioneers.

In addition to the flowers mentioned in the first part of this article, we



Chicory

should call attention to *Tragopon*, salsify, which "calls it a day" at about eleven o'clock in the morning. No wonder a popular name has been attached to it: "Johnny-go-to-bed-at-noon". Both kinds, *T. porrifolius*, the oyster-plant, with purple blossoms, and *T. pratensis*, meadow salsify, with pale yellow heads, seem to have the same sleeping and waking habits. Both can be easily identified at any time by the large, fluffy seed-heads which resemble those of a dandelion candle, only of brownish color and much larger.

Purple thistles (or at least some of them) are apt to open at the very time salsify goes to sleep. *Nuphar polysepalum*, our yellow pond lilies, generally close in the afternoon to the great disappointment of mountain tourists who may only reach their high altitude at that time.

A word of warning may be appropriate here. It would hardly be safe to depend on these flower clocks for catching a train or timing a race. Too many extra factors enter in. Some blossoms may just be sensitive to sunlight. In fact, I know of one dainty gentian, *Chondrophylla*, the moss gentian, which grows high in alpine meadows, that closes its funnel-shaped blue flower whenever a cloud passes over it. (It does likewise upon being picked.)

Other flowers should really be called living thermometers rather than time-tellers; their opening and closing have to do with a certain degree of temperature which, in general, corresponds to a certain time of day in nature. Others again are really hygrometers because they indicate the moisture content of the air.

Then there is the behavior due to a natural periodicity (is there such a word? — there should be.) No matter

what happens, some flowers open at a certain time and close after a definite period has elapsed. On further study we are most apt to find a very real adaptation to the insect on which a particular flower depends for its pollination. Night-bloomers are almost sure to wait for night-flying moths; bees, as we know, do not work on a night-shift, so cannot be depended upon except by day-bloomers.

Night habits of leaves, on the other hand, seem to have to do mostly with internal conditions of the plant itself. A certain internal pressure of its sap, the amount of transpiration, perhaps even chemical changes in the sap may cause a leaf to "fold up".

A great many members of the Pea Family have leaves that go to sleep at nightfall — they might be depended upon for telling the time of day after six or seven o'clock. Poor things, what *do* they do in the polar regions where both day and night last six months each? Evidently our flower clock must be adjusted to different latitudes — yes, and to altitudes in the Rocky Mountain region. Oh, well, we might as well admit it once more: nature never could be successfully and neatly filed away in a hard-and-fast system.

As long as we are closing this topic on a less serious note, let us sound a final warning, that is, not be led astray too easily by names. Four o'clocks, morning glories and evening star flowers are really indicative in their names of their habits. But please do not be misled by the name into ascribing nocturnal habits to this group of plants. Nor expect wake-robin to have alarm clock proclivities, or accuse Shakespeare of alluding to a floral clock when he talks about "sweet thyme".

To put it very simply: these plants have no "horological proclivities".

DAHLIA CULTURE

P. J. STEFFEN

President, Denver Dahlia Society

THE GROWING of dahlias is not an easy hobby, but for those green thumbs who are willing to put forth the effort, the rewards are most gratifying.

This Mexican flower, named after the Swedish botanist, Andreas Dahl, rewards all who plant and nurture it by producing blooms from the end of July until the first heavy frost. It produces a wide variety of blooms which range from the button size to blossoms measuring more than 14" in diameter. The colors cover the spectrum starting with white through the yellows, bronzes, oranges, pinks, reds, lavenders, and purples. Some of the most beautiful shades are found in the blends and the most striking blooms are noted in the bicolours.

The dahlia also offers wide selection in the type of flower it produces. The American Dahlia Society lists 14 classes of Dahlias as follows:

- Decoratives (Formal and Informal)
- Cactus (Straight, semi and incurved)
- Balls
- Collarettes
- Anemones
- Singles
- Mignons
- Orchid Flowering
- Peonies
- Star Types

Because the dahlia is so versatile it can be grown almost anywhere in the garden from border to background. This is possible because, depending on variety, the height can range from

dwarfs to 6-8' giants. The dahlia is grown chiefly as a cut flower because it lends itself well to most kinds of flower arrangements.

Denver Dahlia Society members plant 600 to 750 dahlia roots in the Denver Botanic Gardens each year. These tubers are planted in early May. The tuber is laid flat with the eye facing up about 6 inches deep in sandy soil. A 5-foot stake is driven into the hole and the tuber is placed so that the eye is about 1 inch from the stake. The stake will be used later to support the stalk. A handful of bone meal is mixed thoroughly with the soil in the bottom of the hole. The holes are spaced 3 feet apart so that the plant will have plenty of room for development.

Because of the excellent soil at the Gardens, there is little need for additional fertilizing during the summer, but the home gardener would be wise to apply a fertilizer high in phosphorous and potash and low in nitrogen as the plant matures. In addition, the dahlia should be well mulched to keep the ground cool and to eliminate the need for weeding. Dahlias need a lot of water so they should be well-watered at a minimum of once a week — during the hot summer, more often.

When growing dahlias for show, the exhibitor will want to pinch off flower buds adjacent to the selected bud. This pinching promotes the growth of large, long-stemmed flowers and will promote a sequence of blooms.

After the first killing frost, the task of preparing the tubers for winter storage begins. The first step is to cut the tops off close to the ground. Then, after allowing the roots to fully mature for approximately two weeks, dig them up and allow to dry in the sun for the remainder of the day. The roots should then be placed in boxes and covered with peat, vermiculite or sand and placed in a cool spot for the winter. During the winter it will be necessary to spot check them occasionally for drying out — sprinkling with water when needed. This is particularly important in Colorado where the humidity is so low.

Our dahlia cycle will not be completed until the tubers are divided before planting. When the roots are dug in the fall you will note that for every one planted there is a cluster of three to ten additional tubers attached to the stalk. These must be separated, not only to insure good flowers next year, but also, to increase the inventory of

tubers. The dividing process is a tedious one. Care must be taken to cut a little piece of stalk along with each division. Similar to potatoes, each dahlia tuber must have an “eye” or “bud” for growth to be forthcoming next year. These “eyes” occur at the base of the stalk which necessitates a portion of it being kept attached to the divided root. As cuts are made, sulphur is applied to protect against infection. The dividing or splitting of tubers can be done at any time after digging, but better results are obtained by waiting until early spring for at that time the “eye” is much more easily discernible.

If you have an interest in raising dahlias, come to a Denver Dahlia Society meeting held at the Botanic Gardens House, 909 York, the second Friday of each month at 7:30 in the evening. If you do not have an interest at this time, visit the Gardens this fall and you will become an enthusiast about this most beautiful flower.

----- CUT HERE -----

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1967

'Bell Boy' Pepper

'Foxy' Foxglove

'Wild Cherry' Zinnia (crop failure)

'Spring Giant' Tomato

'Golden Jubilee' Marigold

'Salmon Cream Pink' Knee-Hi Sweet Pea

All-American Award Winners

FRED VETTING,
Rocky Mountain Seed Co.

THESE HAVE BEEN voted by judges as the 1967 All-American Award Winners and will be available in 1967 — with the exception of Pan-American Seed Company's zinnia, 'Wild Cherry', as indicated above. The All-American Selections are usually published in March of the previous year. However, due to the poor production this past season, several will be in short supply.

'Bell Boy' pepper. F-1 Hybrid bell pepper developed by Peto Seed Company, Saticoy, California. The fruit is medium long, blocky, mostly four-lobed, a deep, glossy green. Matures early to deep-red, thick walls and good fruit uniformity. It is resistant to tobacco mosaic virus and is an excellent all-purpose, deep-bell-type with good foliage coverage.

'Spring Giant' tomato. This was developed by Dr. Robert C. Tang of the

Desert Seed Company of El Centro, California. It has the highest early yield of all tomatoes. The fruit is a rich, dark scarlet, deep globe, averaging 7 to 8 ounces and is resistant to verticillium and fusarium wilt. An all-purpose tomato for home gardens, local marketing and canning. The seed supply is limited.

'Foxy' foxglove or digitalis. Developed by Waller Flower Seed Company, Guadalupe, California. The only Silver Medal winner from the 1965 flower and vegetable entries. 'Foxy' is the first and only biennial foxglove to bloom the first season — about five months from seed. The spikes color at about 18 inches and fill up with blooms, finally reaching three feet. Colors include white, cream, yellow, rose and red shades in both solid color and contrasting spots. The outstand-

ing advantage is bringing foxglove into the class of an annual.

'Golden Jubilee' marigold. F-1 Hybrid marigold developed by Bodger Seed, Ltd., El Monte, California. A knee-high type of giant-flowering marigold about 20 inches in height with deep, ball-shaped, refined, carnation-flowering blooms. Bright, golden, full double flowers are 3½ to 4 inches in diameter. Compact plants are excellent for showy beds, borders or hedges, with about a 13-inch spread. The consensus on this fine variety is that it is earlier and more prolific-blooming with superior habits.

'Salmon Cream Pink' Knee-Hi sweet pea. A new knee-high, bush-type sweet pea. 'Salmon Cream Pink' is by Ferry-Morse Seed Company, Inc., of Mountain View, California. The Cuthbertson floribunda brought sweet peas back to gardens all over the country because of their earlier flowering and greater heat tolerance than the late-flowering Giant Spencer variety. We now have the more heat-resistant kind in this new knee-high type. This sturdy, heavy-stemmed variety needs no staking or other support and the stems are long and strong—excellent for cutting. The plant height, depending on cultural and climatic conditions, is from 18 inches to 4 feet tall. The 'Salmon Cream Pink', also called 'San Francisco', stands out as the most sturdy, beautiful and desirable of this type. Other varieties are good, but 'Salmon Cream Pink' was voted the versatile leader.

Attention is also called to the 1966 Award Winners which are now in standard production and are the best of their kind and color to date. These varieties are still grown for your protection from breeder foundation stock seeds by the original growers.



Giant Tomato



"Bell Boy"
Pepper

The Gates Memorial Garden

In 1967

DR. A. C. HILDRETH

SIX SPRINGS have passed since the first plantings were made in the Charles C. Gates Memorial Garden. As a matter of record and also for the benefit of gardeners who may want to try some of these plants on their own grounds, a survey was made of this development in early June and an inventory of the plants was taken.

The idea of such a memorial was first advanced by Mrs. Gates, who also has been the principal contributor toward its planning and construction. Other contributors were the many who, at the request of the Gates family, sent donations to Denver Botanic Gardens in lieu of flowers as expressions of sympathy at the time of Mr. Gates' death.

Mrs. Gates felt that a fitting memorial to her late husband would be a garden, recreating here on the plains some of the atmosphere and features of the landscaping around the family home, The Chateau, in Bear Creek Canyon, which Mr. Gates had so much enjoyed. She also wanted to provide in the Denver Botanic Gardens a secluded retreat where people could rest and meditate in a beautiful and serene mountain setting of trees, rocks, pools and running water.

Mr. S. R. DeBoer who had designed the gardens at The Chateau, also made the design for the Memorial Garden. Mr. DeBoer, always a great admirer of Mr. Charles C. Gates, was much concerned that the memorial he was designing should be worthy of a man of Mr. Gates' stature and, therefore, put his whole mind and heart into the planning.

Mr. DeBoer wanted the plantings to have some special appeal to the public at each season of the year, and he selected the plants accordingly. He also designed the plantings to include a large number of plant species, both native and introduced, in order to acquaint the gardening public with many different species adapted to our conditions and suitable for use in landscaping in our region.

As often happens in actual construction and planting, there were several departures from the original design and also many changes in the planting list. The original plans called for forty-one species of trees and shrubs. Seventeen of these are not now found in the garden. Some never were planted, substitutions were made in certain cases and a few have died. On the other hand, thirteen species of

woody plants not included in the original plan were planted and are now growing.

A surprising number of young seedlings has sprung up among the plantings. These are mostly *Ulmus americana*, American Elm; *Ulmus pumila*, Siberian elm; *Rhamnus cathartica*, common buckthorn; and *Parthenocissus quinquefolia*, Virginia creeper. The elm seedlings, in particular, have grown very rapidly and, unless they are soon removed, will seriously crowd the planted specimens. *Ailanthus altissima*, tree-of-Heaven, seedlings have come up and some have made small trees, but these have already been removed.

At various times several native species of herbaceous perennials and also some woody ground covers have been planted. Most of these disappeared under the hoes of inexperienced laborers on which the Botanic Gardens

have had to depend largely for garden work.

Summing up, the Memorial Garden in the summer of 1967 is rapidly taking on the characteristics that its sponsor and its designer dreamed of — a bit of Rocky Mountain landscape on the plains. There are rocky cliffs, pools, a water-fall, a miniature valley, a meandering stream, trees and smaller plants all blended into a tranquil mountain scene. Each year the image seems more real.

One feature, proposed by Mrs. Gates at the beginning, has not yet been provided. This is the shady retreat for rest and meditation. The site planned for this development is still vacant. It is hoped that this part of the garden can soon be completed. It is hoped also that a suitable plaque indicating in whose memory this garden was created will be installed in an appropriate place.

WOODY SPECIES PLANTED AND NOW GROWING IN GATES' MEMORIAL GARDEN

Abies concolor — White Fir or Concolor Fir

Acer glabrum — Mountain Maple

Alnus tenuifolia — Mountain Alder

Artemisia frigida — Mountain Sage

Betula occidentalis — Fountain Birch

Cercocarpus montanus — Mountain Mahogany

Cornus stolonifera — Dogwood

Crataegus sp. — Hawthorn

Elaeagnus angustifolia — Russian Olive

Juniperus communis — Common Juniper

Juniperus monosperma — One-seed Juniper

Lonicera tatarica — Tatarian Honeysuckle

Picea pungens — Colorado Spruce

Pinus aristata — Bristle-cone Pine

Pinus edulis — Pinyon Pine

Pinus flexilis — Limber Pine

Pinus ponderosa — Ponderosa Pine

Populus tremuloides — Aspen

Potentilla fruticosa — Shrubby Cinquefoil

Prunus americana — American Plum

Prunus melanocarpa — Chokecherry

Pseudotsuga taxifolia — Douglas Fir

Quercus gambelii — Scrub Oak

Rhus trilobata — Skunk Bush

Ribes cereum — Wax Currant

Ribes sp. — Native Currant

Rosa sp. — Rose (unknown)

Rosa woodsii — Woods Rose

Rubus deliciosus — Thimbleberry

Rubus strigosus — Wild Red Raspberry

Salix irrorata — Bluestem Willow

Salix sp. — Native Willow

Sambucus pubens — Redberried Elder

Sorbus aucuparia — European Mountain Ash

Symphocarpos albus — Snowberry

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Alpine
Goldflower

The Green Thumb

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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

SEPTEMBER-OCTOBER 1967



THE COVER

Populus tremuloides — Aspens in Colorado
Photograph Courtesy Mrs. William H. Crisp

THE GREEN THUMB

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The Green Thumb

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HELEN M. VINCENT, *Editor*

SEPTEMBER-OCTOBER 1967

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to the Membership Chairman, Mrs. William Stanley, 3800 East Long Road, Littleton, Colorado 80120 or call 771-3617.

PLANT OF THE MONTH...

Boettcher Memorial Conservatory

PEG HAYWARD

VISITORS to the Denver Botanic Gardens Conservatory notice that two spectacular *Cocos nucifera*, coconut palms, have been added to the plant collection. One leans gracefully over the lower pool in the same location as the original coconut palm, which did not survive the first year, and the other is located in an equally picturesque spot — bending toward the waterfall at the far end of the conservatory.

Cocos nucifera is probably the most widely distributed palm in the world as well as one of the most beautiful and useful. The coconut is a tall, slender, slow-growing palm reaching a height of 100 feet and topped by a majestic crown of glossy, feathery fronds. The leaves are attached directly to the main stem and are commonly 18 to 20 feet in length. Each leaf-base with its sheath encircles the central trunk, the characteristic ridges of which are due to the old leaf-scars.

The history and origin of the coconut palm is one of the intriguing problems of botany. The plant appears to be of insular Pacific origin. The fruit is adapted to long flotation during several months at sea. It is buoyant because of the air entangled in the tissue between the fibers of the husk. But whether the palms have been so widely spread by floating in water or being transported by man cannot be determined.



Cocos nucifera

Cocos nucifera is one of the world's biggest seeds. About four months elapse from the falling of the ripe nut until the seedling emerges. This equals, approximately, the viability of the nut when drifting in the sea. The seedling breaks through the soft eye of the three coconut eyes. Five years are required for the seedling to make the base for the trunk. In eight to fifteen years, when the trunk is as many feet high, it begins to flower. The manner of flowering and fruiting are of considerable interest. The flower-buds are situated in the leaf-axils, one to each leaf. The bud emerges as a pointed club two or three feet long. It is enclosed in a tough, woody, green sheath which splits and falls off. The fountaining flower is much like a gigantic corn tassel. It is composed of many branches which hold small knobs near their bases. The

outer ends of the branches are lined with double rows of grainlike teeth, which are the staminate flowers. Eventually only the small knobs — the female flowers — remain. These may develop into a bunch of as many as forty coconuts. The fruits grow to nearly their full size in five to six months and ripen when ten to twelve months old. A tree continues to bear almost continuously for sixty to eighty years.

The coconut palm is a multi-purpose plant of extreme value to tropical people. The woody shell is lined with a half inch layer of white meat and the remaining interior is partly filled with a sweet liquid, the milk. These are

important food sources. The dried meat, copra, is a major source of oil used in cooking. The husks of the fruit are useful as containers. The fiber (coir) which is the middle layer of the fruit wall, is made into rope, matting, and brushes. The bast-like leaf sheaths are used for native clothing and the leaves for thatching. Sap from the stem of the sheathing leaf surrounding the opening flowers, when evaporated, provides a sugar, or when fermented, a drink called toddy. The trunks are used for building dwellings and rafts. Is it any wonder that the Coconut Palm is called, "one of nature's greatest gifts to man?"



Children's Garden Summer Program

BEVERLY PINCOSKI

THE Children's Garden, a part of the educational program at Denver Botanic Gardens, is in its eighth summer with an enrollment of 45 Advanced and 83 Beginner Gardeners. The 128 individual plots, each containing 100 square feet, were planted and are being cultivated by the youngsters who received instruction in gardening skills before beginning work on the site. Each plot is marked with the name of the gardener.

Mrs. John M. Vittetoe, 923 Cook Street, is Supervisor of the Children's Garden program and she is assisted by Mrs. John E. Donohue and a volunteer staff of mothers and fathers. The Children's Garden is open Monday, Wednesday, and Saturday from 8:30 to 11:30 a.m., and adults are in attendance to answer questions and to supervise.

Plantings this year consist of radishes, lettuce, endive, kale, beans, turnips, carrots, corn, Swiss chard, spin-

ach, onions, tomatoes, peppers, egg plant, cauliflower, cabbage, broccoli, marigolds, four o'clocks, bachelor buttons, and asters. The varieties were chosen for their adaptability to growing conditions in the Denver area. They produce a wide assortment of crops and provide a succession of table fare during the summer gardening season.

Some large areas at the outer edges of the individual plots are used as community gardens in which vining types such as squash, cucumbers, and pumpkins are planted. Vines are not permitted in the individual plots because of lack of space.

At the end of the crop season a Fair will be held where the young gardeners will exhibit their products. Accredited judges will rate the exhibits and award ribbons and prizes. The November-December issue of *The Green Thumb* magazine will carry a more detailed account of this summer project.

Introducing . . .

DAVID BLADES

MR. DAVID A. BLADES, Assistant Conservatory Superintendent, joined the staff of the Denver Botanic Gardens August 1, 1967. Mr. Blades was chosen for the position from a list of seven candidates certified to the Department from Career Service, City and County of Denver. Although he is young and only on the threshold of his career in horticulture, his qualifications suggested a high potential for sound horticultural contributions to our Gardens.

Born and reared in the area of Providence, Rhode Island, David attended the University of Rhode Island, receiving his Bachelor of Science degree in Agriculture and Horticulture in 1965. During the summer of 1964, he attended the Summer Student Program at Longwood Gardens, Kennett Square, Pennsylvania. The Longwood program stresses both academic and practical experience in greenhouse, conservatory and field ornamental horticulture.

From July 1965 until June 1967, Mr. Blades held a two-year fellowship as a post-graduate at the New York Botanical Garden. During the daytime, he gained practical experience in all phases of horticulture and botany normally associated with an established botanical garden. This amounted to working 40 hours per week during the entire two-year period. His evenings were spent as a student in the Gardens' Courses in Botany, Landscape Gardening and Practical Gardening. This Two-Year Program is widely recognized throughout the United States, students holding its Certificates being in great demand by arboreta and botanic gardens.



David Blades

Mr. Blades' hobbies are travelling, bowling, 35 mm slide photography, meteorology, sports, plant hunting and herbarium techniques. He is interested in native flora of the United States and hopes to continue to add to his own herbarium collection which he began at the New York Botanical Gardens.

His wife, Barbara, was associated, on a part time basis, with the New York Botanical Gardens as a library aid. She hopes to enroll in a university here to continue her studies toward a degree in Physical Education.

We hope the people of Denver and especially the staff and associates of the Denver Botanic Gardens will warmly welcome these two new members of our community. We would like them to feel "at home" as quickly as possible.

POPULUS TREMULOIDES

LEN SHOEMAKER

Slender and tall in the morning light,
Their leaves aquiver with joy or fright.
Shady and cool in the blaze of noon,
They croon a rustling, drowsy tune.

Somber and gray as the night draws nigh,
Their fluttering leaves dolorously sigh.
Throughout the summer, a covert preferred
As shelter or refuge by beast and bird.

Goldenly clustered, in autumn they stand,
Promiscuously strewn o'er the mountain land.
Barren in winter with not one leaf,
Seemingly filled with a hopeless grief.

Reanimated by spring's gentle call,
They burst into life, with leaflets small.
Fairest of trees that our forest includes,
They seem to portray all of nature's moods.

THE AUTHOR of this salute to the aspens of Colorado is well-known to many members of the former Colorado Forestry & Horticulture Association because he held the posts of office manager and treasurer of the organization in the 1940's. Many members of Denver Botanic Gardens will recall his great interest in the National Forests since he served with the United States Forest Service as a ranger from 1913 to 1943.

A prolific writer, Mr. Shoemaker is perhaps best known for his book, *Saga of a Forest Ranger*, which tells a lusty story about Bill Kreutzer, the first ranger appointed in this area. This is excellent reading and gives the uninitiated reader an understanding of the rugged life our early rangers endured in their efforts to rid our national forests of trespassers, poachers, thieves and others bent on despoiling them through skulduggery.

Mr. Shoemaker has also compiled a book of verse, nostalgic in tenor, *Wel-*

come to Colorful Colorado, which is dedicated to his beloved state. Written at random through the years, the creative thoughts which flowed from his pen were engendered by his activities in a career which included, believe it or not, ranch hand, mule skinner, stage driver, carpenter, coal miner, timberman and forest ranger!

Now he is leaving Denver, where he and Mrs. Shoemaker have resided for many years. They are moving to Glenwood Springs, to which he is particularly attached, as he engaged for some time in studying the history of the Aspen-Glenwood Springs area.

Mr. Shoemaker has asked your editor to extend his best wishes to all of the many friends he acquired through the years of his association with us. It would give him great pleasure to hear from them. The new address is: Glen Valley Nursing Home, 2305 Blake St., Glenwood Springs, Colorado 81601.

Best wishes from all of us, Len!

It's A Green Light

KENNETH J. MILLS

IN THIS PERIOD of riots, delinquency and general unrest, it was indeed a pleasure to be with nineteen enthusiastic junior and senior high school students who took the first botany summer course offered through the combined efforts of Denver Botanic Gardens and the Denver Public Schools.

This group of students, ten girls and nine boys, represented four of the nine Denver Public High Schools. They selected the course of their own volition — true each must have had Biology I and II and passed with a satisfactory rating. Each student earned one semester credit in the biological sciences in the summer botany course.

If one happened to pass the Botanic Gardens site about 7 a.m. any week day or even some weekend, he would have more than likely noticed two, three or more young people with hoe or garden tool busy in each of their plots, trying to encourage plants to grow — plants from seed, cuttings and transplants. Even though the class did not start until 8 a.m. and was assigned to end one hundred minutes later, at 9:40 a.m., these students often were found in the conservatory, greenhouse, classroom, Botanic Gardens library, or in their garden plot studying or working until nearly noon. What was so refreshing was that these students did not have to spend all this extra time but did so with enthusiasm.

It is true this course was different from the botany course offered during the regular first and second semesters because of its location, the time involved, the freedom from other studies and the availability of so many capable

and willing people — people who generously donated their time and knowledge to give these young men and women an insight into nature which few young people have the privilege to experience today.

The class spent close to twelve hours on field trips to the foothills, sub-alpine and alpine zones. They were fortunate in having Dr. E. H. Brunquist, Curator of Botany, Denver Museum of Natural History, as a guide.

The ecological approach to the study of plants was stressed: what niche the various plants fulfill in nature. This was just one of the four or five areas of emphasis for the summer course.

Another emphasis was practical botany: actually working with plants as one would like to do in his own home or yard; preparing a planter for home or office use, and learning to recognize and appreciate plants in our beautiful state of Colorado. Have you ever considered the pleasure one has in being with a group of people you know? This is also true of being out in nature with plants you know — not just their names but something interesting about them.

Plant morphology and physiology were studied. Without knowing how a plant “ticks”, how its structure fits the various plant functions, one cannot fully appreciate the relationship plants play in life. Actual dissection and use of the microscope gave the student a close-hand look.

Certain experiments were carried out by class teams of three or four students. Not only did they get to observe and test plant growth and development, but they learned to “think on their feet”, work together harmoniously, and prac-

tice scientific procedure in forming and solving a question or hypothesis.

One very important facet of Botany is its language or vocabulary, especially concerning taxonomy. During field trips, class discussion and general study, botanical terms were used again and again until, in many instances, they became familiar enough to be a part of one's own vocabulary.

A discouraging factor of the eight weeks course was that there was not enough time to accomplish all one wanted to do: not enough time to complete the garden as desired: not enough time to study the many interesting plants in the conservatory even with the help of Mr. Ernest Bibee, Superintendent of the Boettcher Memorial Conservatory, and the backing and close support of Dr. L. B. Martin, Director of Denver Botanic Gardens, and his fine staff.

Several of the students were interested in plant photography. Dr. C. W. Tempel was a motivating factor in this challenging hobby when he showed

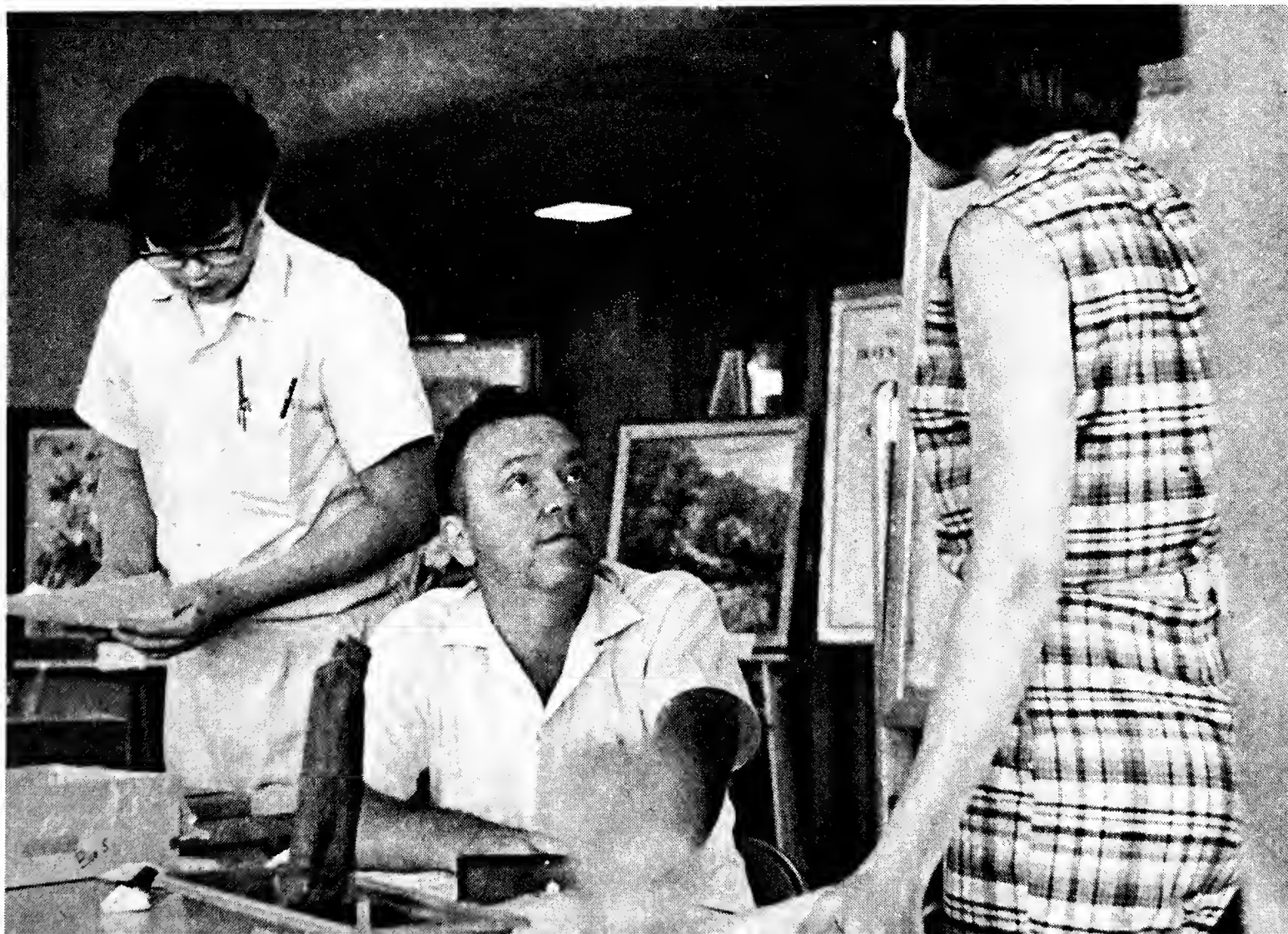
some excellent slides he had taken of Colorado wild flowers.

Few people actually know what the term "herbarium" means, let alone having seen one. Dr. Helen M. Zeiner gave the class some fine pointers and showed the herbarium located at Botanic Gardens House.

After observing Mrs. Beverly Pincoski and the garden staff at work, and having her tell the class about the pre-planning which goes into setting up the outdoor gardens, one realizes more than ever the work and preparation involved in order that Denver may enjoy these beautiful gardens. Also, one notes that women, as well as men, are needed in this profession.

The students, as well as the instructor, evaluated the course and it was definite in all their minds that the course should be carried on in the future, but with some changes to improve certain areas. The enthusiasm and feeling of accomplishment by the students in general certainly gave this botanic experience the "green light".

Kenneth J. Mills, Instructor (center), Charles White and Debbie Dow, George Washington H.S.





Unloading 1,000-pound coconut palm tree to be planted in
Boettcher Memorial Conservatory

A NUMBER OF interesting plants have been added recently to the collection of tropical and sub-tropical plants in the Boettcher Memorial Conservatory of the Denver Botanic Gardens. The opportunity to acquire new plants was presented when Ernest Bibee, Conservatory Superintendent, was consulted about plants for the interior of the Polo Club apartment development. The plants required could not be obtained locally. Arrangements were made for Mr. Bibee to make a trip to Florida to purchase plants for both the Polo Club and the Denver Botanic Gardens Conservatory. The Polo Club agreed to pay the greater part of the expenses incurred in renting a large truck for transporting the plants from Florida.

The City and County of Denver budget for the Gardens furnished four hundred dollars for the purchase of plants for the Conservatory. In addition, two hundred dollars from the Gertrude Howell Memorial Fund was used to purchase two large *Cocos nucifera*, coconut palms.

Mr. Bibee visited nurseries from Homestead to West Palm Beach to select the most desirable plants. Many of the large trees, including the two coconut palms, had to be balled before transporting. The larger palm including its huge ball of soil weighed about a ton. After the plants from various nurseries were ready to transport, they were taken by truck to a loading dock in Miami where they were reloaded into

the forty-foot long truck which carried them to Denver. Approximately two hundred and twenty-five plants, large and small, were packed into the truck. The truck was equipped with an ice compartment which held fifteen hun-

Plant Newcomers To the Conservatory

PEG HAYWARD

dred pounds of ice. Motorized fans circulated the air through the truck to help keep the plants cool and moist in transit. Stops were made along the way to fill the ice compartment and to open up the truck in order to give the plants a supply of fresh air. The plants were watered occasionally to prevent them from becoming too dry.

On arrival in Denver, the plants were immediately unloaded to eliminate the possibility of injury by being left in cramped quarters. A large crane was employed for the purpose of unloading the coconut palms, which were then taken by tractor to the holes previously prepared for them in the Conservatory. (See article, Plant of the Month, *Cocos nucifera*, page 128).

Among the fascinating new plants are several members of the Rutaceae (citrus family). *Citrus grandis* (shaddock) sometimes referred to as the grandfather of the grapefruit, has large pear-shaped fruit with thick rind and coarse grained fruit. *Fortunella japonica* (meiwa or round kumquat) and *F. margarita* (nagami or oval kumquat) are the smallest in size of the citrus fruit plants. They have an acid pulp and rind which are edible but sharply pungent and used mostly in making jelly and marmalades. *Casimiroa edulis* (white sapote or Mexican apple) is also a member of the Rutaceae. It is a native of Mexico and Central America and bears thin-skinned, yellowish-green, quince-like fruit about the size of an orange with cream colored pulp. The fruit and especially the seeds are said to induce sleep two hours after eating. Another citrus, the *Citrus limetta* or Rangpur lime, is a sweet lime which is a horticultural curiosity. It is suitable as a substitute for lime and is used as an ornamental tree.

A tropical American tree with unusual looking fruit is *Annona squamosa* (sugar apple or sweetsop) belonging to the Annonaceae (papaw family). The



Fortunella margarita (oval)

Fortunella japonica (round)



Annona squamosa

fruit is heart-shaped or conical, yellowish-green, up to three inches in diameter and tuberculate. The fruit should be harvested just before ripening as the carpels split and fall apart. Another interesting fruit is *Lucuma nervosa* (canistel or egg-fruit) from South America. This fruit, belonging to the Sapotaceae (chewing gum tree family) is orange-yellow, egg-shaped, tipped with a tiny, sharp beak. The outer skin is papery-thin and covers the edible shell-like sub-rind enclosing a mealy pulp which is the color and consistency of a hard-boiled egg yolk.

Eugenia luschnathiana (pitomba) is an evergreen tree native to Brazil. It has broadly obovoid, orange-yellow fruits with a juicy, soft, orange pulp of an agreeable tart aromatic flavor and is used for jams, jellies, and sherbets. *E. dicrana* (twinberry Eugenia) native to South Florida and the West Indies has a reddish, shaggy bark and fruits which are a reddish-brown color. The *Eugenia*s belong to the Myrtaceae (myrtle family).

Plants representing two families which the Conservatory did not have were added to the collection. *Bulnesia arborea* (vera-wood), a native of Colombia and Venezuela, is a member of

the Zygophyllaceae. This is a timber tree closely related to the *Lignum vitae*, its wood being used for the same purposes. It has finely cut deep-green, pinnate leaves and the brilliant yellow flowers are like butter-cups with a tinge of orange. Theophrastaceae (the joe-wood family) is now represented by two species of *Jacquinia*. *J. keyensis*, native of South Florida and the Bahamas, resembles *Pittosporum* in appearance with thick glossy, dark green foliage. The numerous corymbs of pure white blossoms are deliciously fragrant. *J. pungens* (cudjoe wood) has rigid, evergreen leaves, each with a small, stiff spine which is most forbidding. It carries quantities of bright orange blossoms with an elegant fragrance. Both fruit and roots of the plant are used along the west coast for stupefying fish; its poison is called barbasco.

Bixa orellana, commonly called lip-



Casimiroa edulis

stick or annatto tree, is an ornamental as well as a useful tree. The plant is striking because of its ovate, two-valved fruits which are covered with long prickly hairs and turn reddish-brown when ripe. Annatto dye is obtained from the pulp surrounding the seeds and is used to color butter, cheese, rice, lipstick, and silks. The bark contains

a fiber from which twine is made and a gum similar to gum arabic is obtained from the branches.

Aleurites moluccana (candlenut or varnish tree) is easily recognized by the light foliage caused by a silvery down which covers the leaves. The fruits look a little like English walnuts. Since the kernels have an oil content of about 65%, they furnish a good



Bombax ellipticum

varnish-dryer and are strung on palm spines and used for candles by natives. The kernels are good to eat when roasted but have a purgative effect on many people. The candlenut is the official tree emblem for the State of Hawaii where it is called kukui tree.

The two tree ferns which have been added lend a contrast of foliage with their graceful fronds. *Alsophila australis* (Australian tree fern) is a member of the Cytheaceae. It has feathery foliage which is green above and bluish-green beneath. *Dicksonia fibrosa* (golden tree fern) is a native of New Zealand and belongs to the *Dicksoniaceae*. It carries vivid golden green, arching fronds on its brown trunk.

Byrsonima crassifolia (nanche or pickle tree) is a native of Central America and a member of the Malpighiaceae.

It is highly ornamental when in blossom, bearing clusters of yellow flowers at the branch tips. The flowers turn red in age. The fleshy, yellow fruit with a sour fermented taste is used raw with salt, in soups, pickles, or for stuffing meat.

Another ornamental tree is *Cassia fistula* (golden shower) which seems to radiate sunshine when in blossom. The bright yellow flowers are borne profusely in foot-long, pendant clusters. The fruit, a dark brown pod over two feet long, is well-known in the drug trade for the laxative property of the sweet pulp. The pod gives it the name of pudding pipe tree in India where it is native. It is a member of the Leguminosae (pea family). Another legume is *Tamarindus indica* (tamarind or Indian date) once thought to have come from India and named for it, but probably a native of tropical Africa. It has a handsome, bulb-shaped crown, full of pendulous branches and fine, paripinnate, fresh green leaves. The small pea-shaped flowers, which grow in inconspicuous clusters, are white with a touch of yellow and red. In India the pulp of the fruit is used as an ingredient of curries and chutneys.

A tree with one of the most exotic blossoms is *Bombax ellipticum* (shaving brush) a member of the Bombacaceae. It is a tall, green-trunked tree that bears flowers consisting of massed, upright stamens, which resemble a shaving brush. The stamens are pink or white and emerge from a flower bud three or four inches long which looks like a huge elongated acorn.

Cordia sebestena (geiger or geranium tree) is a tropical evergreen tree which is spectacular when in bloom. It belongs to the Boraginaceae and is native to the Florida Keys and West Indies. Flaming flower clusters of brilliant orange-red terminate almost every



Costus speciosus

shoot. The edible, white fruits which are enclosed in a papery husk, resemble a date in form and have a banana-like odor. Also native to the Florida Keys and West Indies is *Conocarpus erectus* (buttonwood) which belongs to the Combretaceae. The evergreen leaves are oval, glossy and of a silky texture. Tiny, greenish flowers are borne in ball-like clusters and are followed by reddish-brown seed cones with many

scale-like seeds. The heavy wood is in demand for fuel as it gives great heat and almost no smoke.

To briefly mention a few other new plants in the Conservatory, the *Canella winteriana* (wild cinnamon) whose leaves, wood, and bark emit a cinnamon odor; *Manihot esculenta variegata* (cassava or tapioca plant) widely cultivated in tropical countries for the starchy tubers as a source of food; the digitate, whose fresh green leaves are beautifully variegated yellow. *Leea coccinia*, a native of Burma, is a willowy shrub belonging to the Vitaceae (grape family). It has flowers in large, flat-topped clusters, scarlet red in bud, with the spreading corolla lobes pink. *Costus speciosus* (spiral or crepe ginger) is from India. The leaves of this plant are not as long and blade-like as other gingers and are arranged spirally on the stem. The ruffled, white flowers of odd form emerge from behind the scales of brownish-red bracts.

Come and get acquainted with the newcomers at the Conservatory.



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1967

October 4

DR. JAMES R. FEUCHT, Extension Area Horticulturist, Colorado State University: **The Foreigners in Our Home Landscapes.**

November 8

DR. WILLIAM M. KLEIN, Asst. Professor of Botany, Colorado State University: **Native Plants for the Home Landscape**

1968

February 22

DR. ROGER A. ANDERSON, Asst. Professor of Botany, University of Denver: **Those Strange Plants Called Lichens.**

March 21

D. H. MITCHELL, M.D., Curator of Mycology at Denver Botanic Gardens: **Mushrooms and Toadstools, Nature's House Cleaners.**

April 25

DR. ROBERT M. KOSANKE, Geologist, U.S. Geological Survey: **Fossil Plants — A Link With The Past.**

May 23

JACK FASON, Commercial and Scientific Photographer: **The Creative Photographer.**

These lectures will be presented in the Boettcher Memorial Conservatory, 1005 York Street at 8:00 p.m. Tickets are \$1.00 and should be purchased in advance as the seating capacity is limited.

Dwarf Asters

DR. A.C. HILDRETH

"ASTER" is both a Greek word and a Latin word meaning "star." Linnaeus, who gave the name "aster" to a group of plants of the family Compositae, did not intend to imply that they were stellar performers, as are modern stars of stage and screen. Rather, their flower heads, with center disk flowers from which radiate ray flowers, must have reminded him of the rays of light radiated from stars in the sky.

Unfortunately, there is confusion in the use of the word "aster." As indicated, it is the botanical name of a genus of plants. It is also the common name of another kind of plant familiar to gardeners and florists, *Callistephus chinensis*, also called "Annual Aster" or "China Aster." As this plant is not a true aster we shall not here consider it further.

The true asters of our gardens are the perennial asters, often called "Hardy Asters" because the plants survive from year to year. These have the old common name of "Starworts," but this name is now practically unknown to American gardeners. "Fall Asters" is a name that has been applied to the fall-blooming types. These also have been called "Michaelmas Daisies" because they bloom about St. Michael's Day, the 29th of September.

Under the general heading of Michaelmas Daisy modern horticultural writers discuss all the true asters cultivated in our gardens. This name is appropriate for most of them. It is illogical, however, for the spring and summer blooming perennial asters, for example, *Aster alpinus* and its cultivars, which are long past flowering by St. Michael's Day. Logical or not, it seems likely that "Michaelmas Daisy," as a common name for any true asters of our gardens will stick.

About 600 species of aster are recognized by botanists. More than a hundred of these have been cultivated in gardens, at least to the extent that they have been mentioned in horticultural literature. Undoubtedly there are unrecorded instances in which additional wild species have been transplanted to gardens.

Although there are many excellent native American asters, improvement of these species has been accomplished largely by Europeans, particularly by English horticulturists. Most of the hundreds of aster cultivars have resulted from crossing the Italian aster (*Aster amellus*) with the New York aster (*A. novi-belgi*) and with the New England aster (*A. nova-angliae*).

Gardeners were so enthusiastic about the many tall and intermediate cultivars resulting from such hybridization that for decades they largely overlooked the dwarf types. Yet dwarf asters or dwarf Michaelmas Daisies (those less than 2 feet high) are not new. About 20 of the aster species which have been more or less domesticated are typically dwarf.

Also, the height ranges given in botanical descriptions of some supposedly tall and intermediate-height asters indicate that there are strains within these species which tend toward dwarfness, for example, *Aster novi-belgi* 1 to 3 feet, *A. cordifolius* 1 to 5 feet, *A. umbellatus* 1 to 8 feet. Such figures suggest possibilities of selecting from the taller species dwarf types suitable for garden planting or for parents in hybridizing to produce dwarf races.

Interest in dwarf asters was stimulated shortly after World War I, when the British Imperial War Graves Commission wanted hardy edging plants for its military cemeteries in Belgium and

France. The dwarf aster cultivars developed specifically for this purpose were given the non-committal name of *Aster hybridus nanus*. These are said to have been produced by crossing two native American species *Aster novi-belgi* and *A. dumosa*, neither of which is normally dwarf.

In the intervening years many other dwarf cultivars have been introduced. These represent selections from different species and hybrids between species. Most of them originated in England where they have been greatly prized by English horticulturists.

They have been less popular in the United States; however, in 1935 Wayside Gardens of Mentor, Ohio, devoted a small section of their catalog to dwarf asters. In 1936 they expanded their list to include a dozen varieties of these English developments. Their names were Constance, Countess of Dudley, Diana, Hebe, Lavanda, Lilac Time, Lady Henry Maddocks, Marjorie, Nancy, Ronald, Snowdrift and Victor. Of course new ones have since been imported from Europe, the latest being Rosebud, a semi-double rose-pink.

About 20 years ago a new race of dwarf Michaelmas Daisies appeared on the garden scene. These are strictly American. They were developed by the late Professor LeRoy Breithaupt of Corvallis, Oregon. He hybridized the well-known New York Aster (*Aster novi-belgi*) with a wild dwarf aster which he discovered in 1938 on the Oregon coast. This was said to belong to the species *A. douglasi*, native from British Columbia to California and eastward to Wyoming. Neither of the parent species is normally dwarf.

Beginning in 1948, American nurseries, from time to time, have introduced to the gardening public selections of these Breithaupt hybrids. About two dozen have thus far been

released. Among these are the cultivars Alert, Autumn Tide, Bonny Blue, Pacific Amaranth, Pacific Horizons, Party Pink, Persian Rose, Romany, Serenade and Snowball.

Some of these hybrids have been tested at the Denver Botanic Gardens and found satisfactory for our conditions. These dwarf asters have been grouped in nursery catalogs under the headings of Dwarf Oregon Asters and Dwarf Oregon-Pacific Perennial Asters. They have about replaced all the English dwarf asters in the American nursery trade.

Thus far we have considered only the dwarf fall-blooming Michaelmas Daisies. There are, of course, spring and early summer-blooming dwarf asters, particularly *Aster alpinus* and its cultivars. This species is native in the mountains of Europe and in our own Rocky Mountains. It has been grown for four years at the Denver Botanic Gardens and has attracted interest by its large daisy like flowers, blooming in May and June.

These flowers are generally grown from seed, but they do not bloom until the next year after planting. *Aster alpinus* is sometimes listed in seed catalogs as "perennial aster". The flowers are typically blue but there is a white form *albus* and a reddish form *ruber*. An old cultivar of this species is "Goliath" with flowers 2½ inches in diameter and bluish-purple in color.

Dwarf asters in general are adapted to our bright sun, our alkaline soil and our dry air. Although they respond to regular watering during the growing season they are likely to be injured by standing water around their roots in winter. They are seldom troubled by insects or diseases. The clumps should be divided whenever they show overcrowding. Spring is the favorite time for planting and dividing.

Where the Deer and the Antelope Roam . . .



COWBOY

COUNTRY

M. WALTER PESMAN

THERE IS a most attractive little flower of a brick-red color that blooms on the plains practically all summer long, starting in the latter part of May. It reminds one of a miniature hollyhock, not over a foot high, with silvery-gray leaves.

Appropriately enough, it has acquired the name "cowboy's delight."

Now, whether the average cowboy actually pays much attention to it, I don't know. From his lofty seat, four feet removed from the lowly prairie, his mind is not usually on such humble things "that women bother about." Yet, it is surprising how his general love for the outdoors often takes in the colorful blossoms below his boots.

In any case, cowboy's delight is well named in that it is an almost constant companion of what we might call cowboy country. This flower, *Sphaeralcea coccinea*, globe mallow or scarlet globe-mallow (stretching the designation scarlet to an unrealistic degree) decorates the wide open spaces from Manitoba, Canada to Texas, from Iowa to Oregon, going up as high as 10,000 feet where conditions are right but more often staying in the dry plains and sandy valleys.

Even if you did not know it from cowboy ballads, there is a mysterious drawing power to these wide-open spaces, which gets under your skin once you have been under its spell. It goes deeper, much deeper, than the sentimentalism attached to guitar songs about "where the deer and antelope roam" and stressing the lot of the "little dogey."

Is it the smell of the fragrant sagebrush that stays with you once it has entered your nostrils? Is it the limitless view giving the sense of unbounded freedom? Or merely the "gobs of fresh air" that strengthen your body and feed your soul?

The devotee of the prairie is apt to

feel hemmed in and "contaminated by humanity" when forced to live among people and houses, surrounded by sidewalks and revolving doors.

"Don't fence me in," finds a response in thousands of such citizens of the free earth, and in millions of others who carry within themselves the vestige of their pioneering forebears. Most of us respond to the cowboy country as to a natural heritage.

"Sagebrush Association" — that's what ecologists call the community of plants that has, through the ages, resulted in extensive stretches of predominantly *Artemisia tridentata*, the most common sagebrush of our western plains.

Practically one half of Wyoming and Utah, most of Nevada, and all of southern Idaho is sagebrush country. Colorado has limited areas; particularly striking sagebrush vegetation is found in Moffat and Jackson counties. The latter constitutes North Park. Middle Park, just south of it, is also mainly sagebrush although different from South Park, made up of vast hayfields.

The town of Gunnison is a center of another vast sagebrush region, well



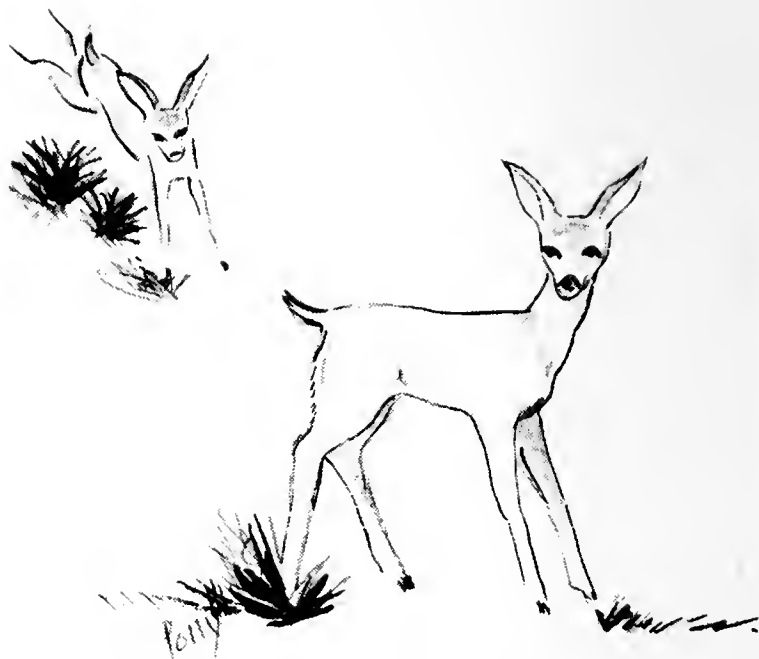
over half a million acres. Scattered fields are found in a number of spots on the western slope of the Rockies.

Only one good sized spot of sagebrush association occurs on the eastern slope extending in a narrow strip south from LaVeta pass and Fort Garland.

Now just why should that spot attract sagebrush, the only spot on the eastern slope? Yes, the altitude is about right; six to eight thousand feet above sea level hits it right for Colorado, and the precipitation, ten to fifteen inches, is good, though sagebrush occurs in much drier spots. What does strike the eye on comparing maps is the geology. "Andesite-basalt and rhyolite" reads the particular outcrop in this spot.

That gives us a hint. The product of that sort of a rock gives rise to a heavy clay soil. And that's what sagebrush likes. And that's why it is so much happier on the western slope, the soil being not gravelly but of a fine texture.

Again, that's what gives rise to the idea that a sage-brush soil is a good agricultural soil. Clay has plenty of fer-



tility, once it is put in good working condition.

And once again, it verifies, what some people assert, that sagebrush is often an indication of volcanic action. In other words, our sagebrush is quite a tattletale in its way.

What most folks do not know is the great age of some of the little sagebrush "trees"; thirty to fifty years is not uncommon. Clever woodworkers have made good use of these old gnarled trunks. They work up beautifully into rustic lamps or other ornaments. Only don't make the mistake of using the wood for a campfire. Its burning odor will drive away more than wild animals.

Next time you wander through the wide-open sagebrush country, on horseback or a-foot, let your imagination wander as well. These beautiful, silvery miniature forests mean not only a source of cowboy ballads, and the center of a livestock industry, not only a picture for your mind with which to conjure up the freedom of the great outdoors but they are a history book of geological eras, a sanitarium for frayed nerves, a soil indicator and a rain-meter.

As an ecological unit the "sagebrush association," of course, means



even more. It is the natural home for rabbit, coyote, deer, antelope, prairie dog and rattler. "Snowbirds" (junco), hawks and owls are common, but sage hens form a major attraction. Their love life has been written up a number of times. It constitutes one of the fascinating examples of spectacular courtship in bird life.

In spring, early in the morning, the female sage hens hold a reception for their eager lovers; or, is it a parade initiated by the males to which the gentler sex is invited? In any case the ceremony is of long standing and is such a sure-thing performance that nature students have been able to make an accurate study.

These parades are held on special "strutting grounds" where the ladies watch while the strutters show off. Stalking around with speckled tails spread out and held erect, a large number of males may vie for attention. Then comes the main stunt. A couple of yellow air sacks on the sides of the throat are blown up until the whole neck and breast become like a huge balloon. The ladies are duly impressed by this circus performance. While their attention is secured, the gentleman lover throws his weight forward, slides on this extended portion of his anatomy for some distance, and then, as a climax, lets out the air with a variety of "chuckling, cackling or rumbling" sounds. What grouse hen could withstand such demonstration of ardent love?

These performances take place early morning and late afternoon in April and May, during which time the black wiry chest feathers of the male are worn off by rubbing on the ground and the females have made their selection.

The honeymoon over, life goes back to the humdrum of raising a family,

escaping the hunters, (the meat is delicious, even though old birds have a decidedly sagebrush flavor), and roaming for grasshoppers, ants, and other insects, with a salad course of plant leaves, buds and flowers.

Should you find it too arduous to get up early enough for the performance on the strutting ground, you may see it as a "still" in the Denver Museum of Natural History. The sage brush group with strutting cocks and watching females is accurately portrayed.

This group also shows some of the plants found in association with the sage brush, such as *Chrysothamnus*, rabbit brush, *Purshia tridentata*, bitterbrush, also called antelope brush and *Gutierrezia*, snake weed or match weed. Less common and restricted to the Arizona-Utah-Colorado region of the sagebrush association, is the interesting *Coleogyne ramosissima*, blackbrush, a black-barked, very spiny shrub, 4 feet high, with tiny, narrow, hairy leaves. It has yellow, four-parted flowers, three quarters of an inch across. They are interesting by having a sheath or lamp-chimney around the "seed" and stigma.

Few flowers are at home among sagebrush, probably because their roots occupy most of the ground between bushes. At the time of sage-hen courtship a conspicuous yellow flower of the sunflower type is sure to draw attention, *Balsamorhiza sagittata*, balsamroot, with large silvery-grey leaves, (white underneath) looking like arrows on stalks and golden flowers all arising from a common center. This balsamroot, likewise, insists on the western slope of the Rockies, probably for the same reason, exacting clay soil. As common as it is there, not a sign of balsamroot east of the Divide!

A beautiful blue flower, blooming in clusters on foot-high stems, belongs to the *Mertensias*, variously called blue-bells, lungwort, or chiming bells. Since the botanists have not agreed on the different kinds, we can only say it belongs in the "lance-leaf" group. The common name "languid lady" is more appropriately applied to the tall *Mertensia* of higher mountains, languishing along swift brooks.

The sagebrush group at the Denver Museum represents a scene in early May looking west to the Elkhorn Range. And, so, it portrays a number of golden yellow, small drooping lilies. They, again, suffer from too many names: fawnlily, dogtooth violet, snow lily, troutlily. At least the botanical name, *Erythronium*, has not changed. And it is still a strikingly beautiful flower which comes up and blooms almost immediately after the snow disappears. Yes, it prefers the western slope again, though it does cross the Divide in various spots.

Orogenia linearifolia, turkey pea or Indian potato, is also shown in the group, much less conspicuous, but interesting. It belongs to the carrot family and has finely-cut foliage and small white flowers, typically arranged in umbrella-like clusters. But deep below the surface is a round, good sized root or corm, relished by the Indians as the ribbed seed was by turkeys.

Does the sagebrush in New Mexico have yellow flowers in late fall? Much of the range country there blossoms out in a gorgeous golden color. Cowboys call it "chamiso."

Ouch!! That takes a lot of explanation. It shows how easy it is to jump at conclusions without careful observation.

Chrysothamnus, rabbit brush, here referred to is sometimes confused with

sage-brush, being of the same general height, but it does have a striking golden bloom in autumn. It has been called chamiso, but wrongly so.

The name, chamiso, has been reserved for another widespread plant of the region *Atriplex canescens*, four-wing salt bush, which is often found with sagebrush, or close to it. "Chico" is another name for it.

Then, to clear up the possible confusion, there is a third little shrub involved called *Gutierrezia*, snakeweed, which looks like rabbit brush, only smaller and which covers miles and miles of "cowboy country." When in bloom it completely covers the prairie with a golden-yellow blanket. (Incidentally, this is often a sign of overgrazing).

Yes, it takes a trained eye to notice these changes from sagebrush country to related associations. Each of the shrubs mentioned above may be found with the sagebrush, or they may form an association of their own, or, again, be the transition to a different one.

There is, for instance, this "chamiso," chicobrush or fourwing saltbush. Its very name tells the story, "saltbush." Its narrow, silvery leaves have a decidedly salty taste, it can stand considerable alkalinity in the soil. Where sagebrush would give up, chico takes over.

But even it has a limit where it can no longer "take it." Then, where the alkaline soil begins to show in definite white spots, when there is practically no drainage, and where there is often considerable "ground-water," another plant association becomes the well-established one. Its dominant plant is *Sarcobatus vermiculatus*, greasewood.

In sharp contrast to the silvery-gray of sagebrush, greasewood appears a

luscious dark green, almost unnaturally green, as if a stage artist had applied the paintbrush with too great an effort at making a good showing. In fact, the entire shrub, spaced evenly, four to seven feet apart, up to four or five feet in height, looks "stagey." The leaves are thick and fleshy, almost like stubby pine needles, shiny, not quite an inch long. Stems are white-barked and spiny-tipped, except where the inconspicuous male flowers adorn them. The female flowers are just below them, separate in the leaf axils; they change to tiny ski-caps, with a wide, thin saucer underneath.

In between these shrubs — nothing. Nothing but the white alkali, crackling as you step on it. You wonder how plants can grow in it. And yet, there is one plant that can take even more salt content, provided it has moisture close to the surface. It draws attention to itself in late summer and fall, a beautiful purple color, highly decorative with its fine branches. It is, appropriately enough, called *Suaeda* seepweed. An annual, it comes back from seed year after year. *Suaeda depressa* and its variety *S. erecta* are both common.

The "greasewood association" is often referred to as the Salt Desert shrub association, subdivisions of which are 1. greasewood proper, 2. pickleweed, more common in Utah, (Salt Lake), Nevada and Arizona, and 3. saltgrass, in those alkali flats where a supply of fresh water flows during flood time. It becomes conspicuous in late summer by its early yellow coloring.

We were talking about chamiso or chico, the companion of sagebrush, which may well occupy sandy ground in contrast to it.

Chico has a close relative, again



with a fascinating "cowboy" name, *Atriplex confertifolia*, Shadscale.

Shadscale usually grows in neat pin-cushion formation, over 2 to 3 feet tall. What makes it so attractive is its neat, almost circular leaf, of a bright-silvery color. Here again, the effect is that of a stage-setting, or of neat, interior decorating.

In Colorado the most extensive shadscale covering is along the riverbed from Montrose to Delta and Grand Junction, exactly following the Mancos shale sedimentation. The river course itself is an almost solid growth of greasewood.

The above is not meant to be a complete record of the plants in our "cowboy" country. Widespread as it is, this would be an impossibility.

What it does aim to do is to give a little help to the uninitiated visitor of this vast region, often just referred to as the "land of the purple sage," most inaccurate and misleading designation.

Perhaps, the next time you visit a dude ranch, you'll find as much interest in the types of vegetation as in the cowboy ballads, the painful "crick-in-the-back," and the stories of the Old West, the pioneers and the vanishing red man.

Vines

For The Indoor Garden

DR. HELEN MARSH ZEINER

NO HOUSE PLANT collection is complete without a few vines or trailing plants to add interest and variety. No matter what your requirements, you should be able to find a suitable plant among the surprisingly large number of vining plants available. These represent many different plant families, and come to us from many different parts of the world.

Araceae, the arum family, is represented by several easy-to-grow vines and others requiring more care.

One of the most popular and easiest to grow of all vines belongs to this family. This is *Philodendron oxycardium*, the heart-leaved philodendron sometimes sold as *P. cordatum*. This plant is equally at home in soil or in water. It is not particular as to light requirements, although it does best in strong filtered light. It withstands high temperatures and low humidity well. In general, it is very tolerant of abuse. *P. oxycardium* can be trained upward on a support or permitted to hang down over the sides of a pot. In time, it will lose its lower leaves. When this happens, cut off and reroot the leafy portion. This can be easily done in water

or in soil. *Philodendron* is slow to root, but not difficult.

Philodendron micans, the velvet-leaved philodendron, is a similar but much more attractive vine with velvety heart-shaped leaves. It is also more difficult to grow, but it is well worth the extra care needed. *P. micans* is very sensitive to sudden temperature changes, and chilling may cause the leaves to drop. It is also less tolerant of low humidity than *P. oxycardium*.

Scindapsus (Pothos) is a hardy vining plant often mistakenly called variegated philodendron. While it is similar to philodendron in general appearance, the leaves are not heart-shaped and the petioles are longer. A frequently used common name is devil's ivy. *S. aureus* is variegated with yellow markings, and is usually sold as golden pothos. *S. aureus* marble queen is a beautiful variety with a great deal of white in the leaves. Although marble queen is more difficult to maintain than varieties with more chlorophyll in the leaves, it will live a long time when grown in a warm place and kept rather dry.

The very large philodendrons trained

to climb on moss sticks are good choices for large rooms in modern homes. To keep a large philodendron at its best, see that it is planted in a porous soil containing plenty of peat. Keep the soil moist, but not wet. Wash the leaves frequently. Be sure that the plant receives intense but filtered light. At high temperatures, inadequate light causes the plant to produce smaller and smaller leaves.

For a medium-sized climber, try *Syngonium podophyllum*, another representative of the arum family quite different in appearance from any of the philodendrons. *Syngonium* has attractive thin three- to five-parted leaves which are green with silvery variations. The plant can be kept pruned for use as a table or pot plant, or it can be grown on a support or allowed to trail over the sides of the pot. It is very easy to grow and is good for that poorly lighted corner.

Hedera helix, English ivy, belongs to *Araliaceae*, the ginseng family. Numerous varieties of English ivy are readily available. They range from bushy plants with little tendency to trail to true vines which may be trained to frame a window or cover a trellis. Most problems with English ivy are the result of too much heat and too little humidity. Since this plant is a native of moist, temperate climates, it should be grown in as cool a location as possible, given good light, and kept moist. The leaves should be sprayed with water at least once a week. In addition to being beneficial to the general health of the plant, spraying the leaves helps

to prevent red spider which may infest English ivies grown in hot, dry air.

Two old-fashioned vining plants which are both easy-to-grow and attractive are *Senecio mikanoides*, German ivy; and *Plectranthus australis*, Swedish ivy or Irish ivy.

German ivy is a member of *Compositae*, the composite family, to which daisies and asters belong. When conditions are right, German ivy will produce a yellow flower which leaves no doubt that the plant is a composite. The leaves of German ivy are thin, bright green, and shaped very much like those of English ivy. It can be trained on a pot trellis or can be permitted to trail over the sides of the pot. It should be kept pinched back to produce a bushy plant. Cuttings root readily in soil or in water. An east or a north window is a good location for German ivy. Avoid hot, bright sun and keep in a cool part of the room.

Plectranthus belongs to *Labiatae*, the mint family, and exhibits the square stem and opposite leaves characteristic of this family. Occasionally the plant will bloom, producing a spike of typical two-lipped flowers which are interesting but not particularly showy or attractive. Swedish ivy is very tolerant of conditions in the average home, and might be considered as the easiest of all trailing plants to grow. It is by nature a trailer rather than a climber, and is best handled this way rather than by attempting to train it on a trellis or upright support. The round leaves are shiny and bright green, with neatly scalloped edges. The stems may be

reddish or green, depending on the amount of light the plant receives. *Plectranthus* grows best in bright filtered light. Too much light bleaches the leaves, while too little results in leggy, succulent growth and pale leaves. This plant is very easily propagated and is a rapid grower. Keep it pinched back to induce branching.

If you are looking for an unusual plant, consider *Episcia* or *Columnea*, both members of the family *Gesneriaceae*, to which African violets and Gloxinias belong. Both of these plants, which are trailers rather than true vines, require much the same care as African violets. They should be planted in soil containing a good proportion of humus, should be given filtered light, and should be kept evenly moist but not wet.

Several varieties of *Episcia* are on the market, but perhaps the most handsome is *E. cupreata*. This plant has beautiful velvety metallic leaves which make it an attractive foliage plant. If conditions are suitable, *Episcia* produces red flowers in the axils of the leaves. This has led to the common name, flame violet. It is suggested that you grow *Episcia* on a pebble tray, letting the plant trail down over the sides of the pot. Buds may blast if the air is too dry, and the pebble tray provides a humid atmosphere around the plant.

Columnea 'Stavenger', Norse fire plant, is the common *Columnea* offered in this area. It is excellent for hanging baskets, since it produces a profusion of trailing stems with small, shiny, dark

green leaves. The flowers are bright red and elongate, produced in the axils of the leaves. If *Columnea* is to bloom, it should be kept at a temperature of 50-60 degrees F. for three weeks in December. This should result in blooms in April or May. Dry air is probably this plant's worst enemy, so spray the foliage frequently.

From *Asclepiadaceae*, the milkweed family, we can choose two very different vines.

One is the easy-to-grow old-fashioned *Ceropegia woodi*, known as chain of hearts or rosary plant. The small, slightly fleshy leaves are heart-shaped with silvery markings. They occur in pairs along the slender stems, and have given the plant the common name, chain of hearts. The name rosary plant comes from bead-like growths at the axils of the leaves. These structures serve to propagate the plant. *Ceropegia* can be trained on an upright support or placed on a shelf where the stems can hang down. They will reach a length of several feet. This is a very tolerant plant which can be grown in sun or in filtered light, and which withstands high temperatures well. It is a good choice for a small vine.

Hoya carnosa, the wax plant, is another familiar vine from the milkweed family. *Hoya* produces clusters of beautiful pink and white waxy flowers which are very fragrant. The leaves are thick and waxy and elliptic in shape. A variegated form is now commonly available. Hoyas do well when allowed to climb on a support such as a moss pole. They should be watered

thoroughly and then allowed to dry out before watering again. The foliage should be washed frequently. An east window is a good location. During late fall and early winter, put the plant in a cool place and rest it by keeping the soil quite dry. If a hoya does not bloom, it may be due to lack of a rest period in a cool temperature, or it may be because you cut off the old stem or spur on which flowers were produced. These should be left, as next year's flowers come from the same place.

Among the most durable of all vines for the home are *Cissus rhombifolia*, grape ivy, and *C. antarctica*, kangaroo ivy. These vines are members of *Vitaceae*, the grape family.

Grape ivy, a plant from the West Indies, has leaves which somewhat resemble those of edible grapes to which it is related. They are made up of three sharply-toothed leaflets, and are thin, dark green, and glossy. The youngest stems are green with white hairs. As they mature, the stems become green with brown hairs, and finally brown. Tendrils may be present. Young plants are bushy and upright, but as they grow they become vine-like. Grape ivy can be trained to climb on a support or can be used as a drooping vine.

Kangaroo ivy, from Australia, has simple, undivided leaves which are long and narrow with toothed margins. Under ideal conditions they may reach a length of six inches, but in the average home they seldom attain this size.

Both grape ivy and kangaroo ivy are very tolerant plants. They will tolerate

poor light (particularly kangaroo ivy), although with some sun they will make better growth. They both do well when watered thoroughly and then permitted to dry between waterings. Wash the leaves to prevent red spider and to compensate for lack of humidity in the air.

Tolerant plants such as these will be satisfactory in appearance even when suffering considerable abuse. When well-cared for, they will be beautiful plants worthy of a place in any indoor garden.

An old-fashioned trailer which should be used more often is *Campanula isophylla*, a member of *Campanulaceae*, the bellflower family. *C. isophylla* produces lavender five-petaled flowers typical of *Campanulaceae*. *C. isophylla alba* is a beautiful white-flowered variety.

Falling stars is a very appropriate common name. When in bloom, sprays of five-petaled flowers cascade in masses over the sides of the pot. The plant has a long blooming period, generally starting in July or August and continuing through November. Old blossoms should be removed to prolong the period of bloom as long as possible. After blooming, cut off the old flowering stems at the base. Unless you do this, the plant will develop long, straggly, unattractive stems. New shoots will grow to replace those cut off. The cut-off portions can be rooted in moist soil. When blooming, falling stars uses large amounts of water and should be kept moist at all times. However, it should never stand in water. Some sun

is necessary, but hot bright sun is not desirable. An east window is ideal.

Commelinaceae, the spiderwort family, offers several genera of vining plants which are extremely easy to grow. *Zebrina* and *Tradescantia* are very common. The name wandering Jew is given to almost any of these plants. These plants can be grown in soil or in water. They can be used outdoors in the summer. Cuttings taken in early fall produce plants for indoor use. Foliage may be green, purple, or variegated. Small lavender or blue flowers may appear.

From *Urticaceae*, the nettle family, comes *Pellionia pulchra*, a beautiful trailer which is not too widely known. The plant has attractive leaves arranged in flat sprays. It will not stand overwatering or poor drainage. *Helxine soleioli*, the well-known baby's tears, also belongs to this family. It needs humidity and does best in a terrarium or on a pebble tray. Spray the leaves often.

Piperaceae, the pepper family, contains the *Peperomias*, most of which are not vines. However, *Peperomia fosteri* is a very good small trailer. It needs strong indirect light. It should be soaked well and then allowed to dry out between waterings. It must have good drainage.

Fittonia verschaffelti, family *Acanthaceae*, the acanthus family, is a beautiful tropical trailer frequently offered in the garden shops. It has thin green leaves with white veins. Unfortunately, fittonia cannot tolerate dry air. It should be grown on a pebble tray or in

a terrarium, where it may become so lush that it requires cutting back to keep it within bounds.

Although not truly vines or trailers, two plants from *Liliaceae*, the lily family, serve the same purpose.

The first is *Chlorophytum comosum*, St. Bernard's lily or spider plant. The plant has long, grasslike leaves, often white striped, which hang down over the sides of the pot. The plant puts out long runners which bear small white flowers at the ends. After blooming, new plants are produced at the ends of the runners.

The second is *Asparagus sprengeri*, called emerald feather or trailing asparagus. Needle-like leaves are produced on numerous branches which hang over the pot. White flowers may be produced. This is an easy-to-grow plant good for hanging baskets.

From *Saxifragaceae*, the Saxifrage family, we get *Saxifraga sarmentosa*, known by the misleading common names of strawberry begonia or strawberry geranium. Like *Chlorophytum*, this plant sends out runners which produce new plants at the ends. This is a much smaller plant than *Chlorophytum*, and has rounded, hairy leaves. Clusters of small white flowers on upright stems may be produced.

This is only a partial listing of the vining plants easily obtainable. Keep watch in any store which sells house plants. Sometimes very unusual vines will be offered. They may not all succeed in the dry air of the Denver area, but you will have fun trying something new.

1967

TERRACE AND GARDEN TOUR

MARCIA REHMUS

ON JULY 27 from 2 p.m. to 8 p.m. over five hundred enthusiastic gardeners benefited the Denver Botanic Gardens by browsing through the eleven show gardens on the 1967 Terrace and Garden Tour. Concentrated in the Country Club and Crestmoor areas this year for the convenience of visitors, the gardens were chosen to illustrate variety in design, in plant materials for both sunny and shady areas, special features, and types of maintenance.

The eleven homeowners who kindly consented to open their grounds to the public were: Mr. and Mrs. Roger B. Mead, 144 Race Street; Mr. and Mrs. Montgomery Dorsey, 177 Race Street; Mrs. Eugene Dines, Sr., 1953 East Third Avenue; Dr. and Mrs. Martin E. Anderson, Jr., 361 Race Street; Mr. and Mrs. E.T.H. Talmage, Jr., 275 Vine Street; Mr. and Mrs. Dudley Green, 1 Crestmoor Drive; Mrs. Jeanne Iacino, 3 Crestmoor Drive; Mr. and Mrs. C. L. Hubner, 311 Jasmine Street; Mr. and Mrs. Joe K. Miller, 125 Jasmine Street; Mr. and Mrs. Thomas W. Payne, 85 Southmoor Drive; and Mr. and Mrs. Paul E. Youmans, 99 Southmoor Drive.

Despite the continual rain and hail storms during the late spring and early

summer this year and some misgivings of the garden owners, the gardens blossomed forth beautifully on the day of the Tour. Only a few gardens appeared somewhat less "showy" than usual due to damage by the inclement weather. Many excellent examples of yard design, including much variety in stonework, were shown on this year's Tour. Plans ranged from the small townhouse garden of Mrs. Dines, designed for minimum maintenance, to the split-level Georgetown walking garden of the Andersons, to the extremely spacious, stately, extensively planted Dorsey grounds. Other interesting contrasts were the Talmage garden with its unique open terrace and conservatory-greenhouse featuring azaleas, orchids, gardenias, and unusual potted plants; the Payne yard, which contains a children's play area and an attractive brick retaining wall which provides a terrace for numerous high country plantings; and the Miller garden, a completely owner-maintained yard featuring raised beds of petunias planted in panels according to colors, a greenhouse, large vegetable beds, and torches for night lighting.

Many thanks go to Mr. Kenneth Wilmore of Green Bowers Nurseries and

to the members of the Denver Botanic Gardens Guild who served as horticultural experts in many of the gardens. Aided by their extensive knowledge and by the plant labels provided by the head hostess in each garden, visitors could admire the various plantings and designs as well as glean much helpful information to adapt for use in their own yards.

Box suppers, an innovation this year, appeared to be popularly received. Catered by Chef Leo and organized by Mrs. Mackintosh Brown and the Garden Club of Denver, over 100 suppers were sold. The Garden Club deserves much applause for the very attractive table arrangements and many preparatory hours involved.

This year's addition of evening hours afforded those who worked an opportunity to view the gardens also. For those who preferred not to drive, bus transportation was available from the

Denver Botanic Gardens at 2 p.m.

Totally, the Tour, sponsored by the Denver Botanic Gardens Guild, netted a \$1600 profit for the Denver Botanic Gardens. Credit for a successful Tour goes to the enthusiastic committee chairmen who directed nearly forty volunteers. The 1967 Terrace and Garden Tour Chairmen were: General Chairman, Mrs. William E. Russell; Co-Chairman, Mrs. Thomas Payne; Box Suppers, Denver Garden Club and Mrs. Mackintosh Brown; Garden Experts, Mrs. Robert L. Davis; Garden Finding Committee, Mrs. Chard P. Smith, Jr., Mrs. R. L. Davis; Hostesses, Mrs. Donald L. Harlan; Publicity, Mrs. Frederick P. Rehmus; Signs and Supplies, Mrs. James Kilgroe; Tickets, Mrs. Loring Brock; Co-Chairmen, Mrs. Donald P. Anderson, Mrs. Gary Christy; Transportation, Mrs. R. Earle Honnen.

Hope you were there.

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Cowboy
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The Green Thumb

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Botanic Gardens House

DENVER BOTANIC GARDENS

DENVER, COLORADO

This is a non-profit organization supported by municipal and private funds.

A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

NOVEMBER-DECEMBER 1967



THE COVER

Colorado Winter Scene

Photograph Courtesy Charles M. Major

THE GREEN THUMB

VOLUME TWENTY-FOUR, NUMBER SIX

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The Green Thumb

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NOVEMBER-DECEMBER 1967

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to the Membership Chairman, Mrs. William Stanley, 3800 East Long Road, Littleton, Colorado 80120 or call 771-3617.

PLANT OF THE MONTH...

Boettcher Memorial Conservatory

PEG HAYWARD

Passiflora, passion flower, is a large genus of mostly tendril-climbing vines which comprise the only cultivated genus of the family *Passifloraceae*. Visitors to Denver Botanic Gardens may be rewarded by seeing the remarkable flowers produced by one or more species represented in the conservatory.

The passion flower is so named because each part of the flower has been associated with the passion and life of Jesus. The ten colored petals and sepals represent the ten apostles present at the crucifixion (without Judas and Peter). In the center of the flower are a large number of filaments which represent the crown of thorns, or others contend they form the halo about Christ's head. There are five stamens, which suggest the five wounds which He received and the three sections of the pistil typify the three nails. The stamens and pistils are borne upon a column which may be compared to the one to which Jesus was tied. In some species the leaves are three-parted and represent the Trinity. In others, the leaves are five-parted and represent the fingers of the persecutor's hands. The long tendrils stand for the cords or scourges.

Passifloraceae contains about 18 genera and at least 600 species native throughout the tropics and subtropics, especially of the New World. Many



Passiflora, Passion Flower

species are cultivated for their interesting ornamental flowers, and others are grown for their edible fruits.

Several species are included in the conservatory collection. *P. caerulea* (bluecrown passion flower) comes from Brazil. The leaves are five-lobed and somewhat grayish beneath. The flowers, 3 to 4 inches wide, are pink with the white crown marked purple. The egg-shaped, yellow fruits are 1½ inches long. *P. incarnata* (maypop or wild passion flower) is one of the hardiest. Its leaves are three-lobed, the lobes toothed. The flowers are 2 inches wide, white, the crown purplish-pink. It was chosen in 1920 as the state flower of Tennessee. *P. edulis* (purple granadilla), native of Brazil, is grown for its edible fruit. The leaves are three-lobed, slightly heart-shaped at the base and irregularly toothed. The fruit is a dull

brown-purple, dotted when ripe, 2½ inches long, and is used for sherbets, salads, and drinks. *P. quadrangularis* (granadilla or giant granadilla) is the leading passion vine cultivated for its fruit which is greenish-yellow and nearly 10 inches long. This species has winged stems and unlobed leaves. Its fragrant flowers, 3 inches wide, are white, the crown having five rows of white and purple rays. *P. alata* bears

leaves which are entire. The flowers are up to 5 inches across, white, red inside, the crown red, purple and white. *Passiflora vitifolia* (red passion flower) is a somewhat sparse vine with its rich, red flowers appearing in clusters of two or three at a time along the length of the stem.

Passiflora surely provides some of the most fascinating and dramatic flowers in the world.

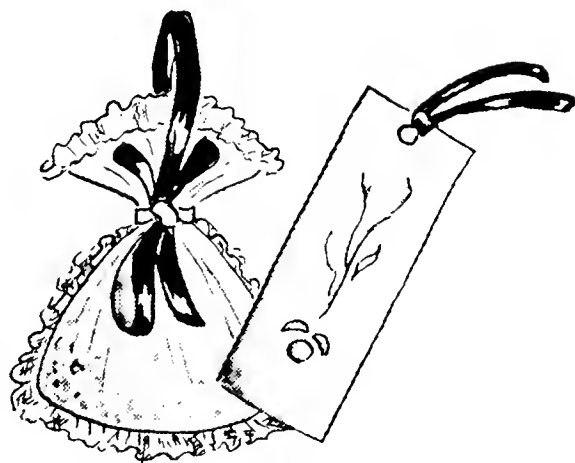


Christmas Preview

CATHY PETERSEN

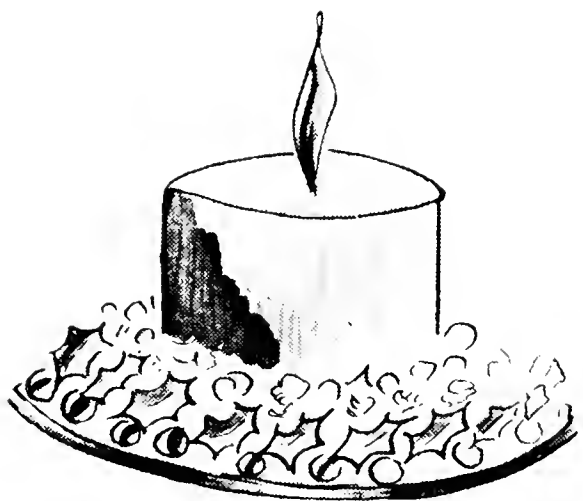
CHRISTMAS is just around the corner, and the Denver Botanic Gardens Gift Shop will be bursting at the seams with new gift items. Therefore, the gift shop will expand just around the corner into the spacious Southroom of the conservatory for the Christmas Sale, December 1 and 2.

Unusual gifts have been collected from around the world: colorful wall hangings; imported toys for all ages; brightly decorated baked-bread tree



ornaments; hand-carved creches, waiting to become family heirlooms; gayly flowered papier-mache boxes; enchanting forest "critters" in fine china; real flowers captured in paper weights; photo cases and bookmarks; owl incense burners, painstakingly copied from antiques.

Look for Isabel Bloom's sculpture, charming figures of children, birds and animals; George Hammond's exciting real pansy pin and earring sets. A lim-



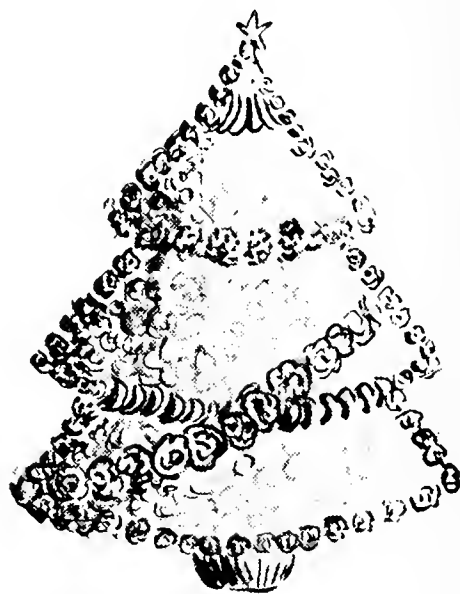
ited collection of tropical plants in attractive containers will be among the unusual gifts waiting your selection.

For a truly beautiful Christmas, trim your tree and house with exceptional holiday decorations made at the Denver Botanic Gardens workshop. Its famous wreaths and charming pine cone angels will be available again this year. Many new handmade decorations have been added, among them birds' nests with perky birds, and gay papier-

mache fruits to use year around.

A special booth for the arranger will offer a large selection of dried plant material, including some unusual plant material from the conservatory. Beginners will find books to help them in this fascinating and creative field.

For gifts from stocking-stuffers to the grand gift for someone special, visit the conservatory Southroom Friday, December 1 and Saturday, December 2, hours 10 a.m. to 4:30 p.m.



BOOKS, BOOKS

BERN NEIL

BOOKS TO ENJOY, books to give, and books to study, all can be found in the Conservatory Gift Shop.

A few new additions to the list of more than 125 titles are briefly described below:

Meet the Natives, M. Walter Pesian, seventh edition, recently published by Denver Botanic Gardens. Plants are classified according to the life zone where they grow, according to color of flowers and according to season of bloom. The many illustrations, sketches and terse descriptions aid in identifying each plant. Common and botanical names are given for more than 700 plants. This is a valuable field guide for the amateur.

Rocky Mountain Flora, Dr. William A. Weber. Serious botanists as well as interested amateurs can use the keys, illustrations and text in identifying and classifying the plants of this region.

Rocky Mountain Horticulture, George W. Kelly, replaces his popular *Good Gardens in the Sunshine States*, which has been out of print for some time. Newcomers will find this paperback volume helpful in the selection and care of plants suitable for this climate.

Picture Book of Annuals and *Picture Book of Perennials*, both by Arno and Irene Nehrling, are concise encyclopedias, well-illustrated, with de-

scriptions for easy identification as well as advice on planting, feeding, pruning and propagation.

Three new titles in the widely acclaimed series "Our Living World of Nature" will be available this fall. Published jointly by McGraw-Hill and the World Book Encyclopedia, and developed in cooperation with the United States Department of the Interior, these books should appeal to nature lovers and conservationists. *Life of Rivers and Streams*, by Robert L.

Usinger, is in print now. *Life of the Prairies and Plains*, Durward L. Allen, was scheduled for October publication, and *Life of the Pond*, William Hopkins Amos, is due in December.

Associates serving as volunteers in the gift shop gladly offer help in selecting the right book to enrich your gardening hobby. Come in and browse. For your convenience, any prepaid order will be mailed. With your request please include sales tax plus 50 cents for postage and handling.

Books Available in Gift Shop

ABC of Japanese Gardening	1.00
African Violets (a simple system of home culture)	Bowman 1.50
African Violet and Gesneriad Questions Answered	Wilson 6.95
Ambitious Gardener	Gestefield 3.50
Arts and Crafts for Flower Arrangers	Seibel 5.95
Better Homes and Gardens Book of House Plants	2.95
Better Homes and Gardens Book of Flower Arrangements	2.95
Birds of Colorado	Bailey & Neidrach 35.00
Cacti of the Southwest	Erle 2.25
Chrysanthemum Book	Cummings 7.95
Colorado Mushrooms	Wells & Mitchell 2.00
Creative Decorations with Dried Flowers	Thompson 6.95
Cultivated Aroids	Birdseye 5.00
New Decorations with Pods, Cones and Leaves	Van Rensselaer 6.95
Driftwood Book, second edition	Thompson 5.95
Exotic Plants, Illustrated	Graf 4.50
Flowering Shrubs	Zucker 17.50
Fluorescent Light Gardening	Cherry 6.95
Fruit and Vegetable Arrangements	Cyphers 4.50
Fun without Flowers	Clements 5.95
Guide to Rock Garden Plants	Griffith 6.95
Herbs for Every Garden	Foster 4.95
High Country Names	Arp & Kingery 4.95
The Iris Book	Price 7.95
Iris, Goddess of the Garden	Ross 7.95
Let's Grow Lilies	American Lily Society 1.00
Native Orchids of Colorado	Long 1.25
Meet the Natives	Pesman 4.50
New Book of Foliage Arrangements	Cyphers 4.95
New Complete Book of African Violets	Wilson 5.95
1001 House Plant Questions Answered	Schuyler 5.95
Picture Book of Annuals	Nehrling 5.95
Picture Book of Perennials	Nehrling 5.95
Pictorial Encyclopedia of Plants and Flowers	Norak 10.00
Rocky Mountain Flora	Weber 9.40
Rocky Mountain Horticulture	Kelly 4.00
Trees for American Gardens	Wyman 10.95
Western Forest Trees	Berry 1.50
What Tree Is This?	Barbour .50
Rose Culture in the Denver Area, Special Issue, Green Thumb Magazine50
Complete Selection of Brooklyn Botanic Garden Handbooks	1.00 & 1.25

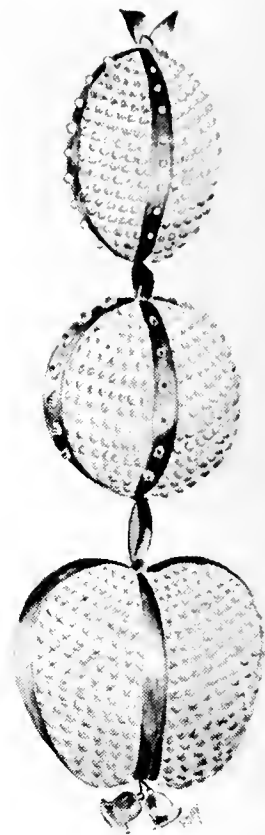
Many other books are available in addition to those listed here.

POMME D'AMBRE

AVALONNE KOSANKE

POMANDER BALLS have been a favored gift for "fayre ladyes" since Queen Elizabeth received a "gyrdle of pomanders" from an unnamed courtier. Silversmiths and court jewelers were kept busy designing new holders for perfumes and spices so they might be worn on every occasion. Exquisite lockets to be worn at the throat usually contained sweet herbs or perfume. Intricately carved cases contained larger pomanders to be worn at the waist. The French word "pomme" indicated an apple-shaped object, referring to the small ball or even to its container. "Ambre" came from ambergris, a waxy substance from the sperm whale. This was the chief, and very costly, fixative used in early times.

Pomander balls were decorative, even jewel-like, but their purpose was a practical one. They served their wearers a moment's relief against the primitive plumbing and unwashed populace around them. Not only ladies sought relief in this manner. Doctors carried pomanders to insure against infection from their patients. Lawyers and judges relied on their protective



powers against the jail fever of their clients. Courtiers moving through the streets in sedan chairs and travelers walking the streets leaned heavily on spice balls and perfumes to shut out less desirable odors. Cardinal Wolsey carried a special kind of pomander, the rind of an orange enclosing a vinegar-soaked sponge. Herb vinegars were considered sure barriers against pestilence.

While the rich, the professional, and the ruling classes pioneered in the use of the pomander, it remained for the housewife to adapt it to her own needs, abilities, and income. Beeswax was cheaper than ambergris, orris root more available than benzoin. Garden earth and drained apple pulp cost even less as bases. In place of the rare and costly orange, the frugal Colonial housewife made use of the apple to hold her precious cloves. Sweet bay, costmary, rosemary, lavender, and rue could be grown in the tiniest garden. Blanket chests and linen drawers, clothes closets and storage rooms sang with the fragrance she carefully harvested and preserved.

One of the most cherished ties be-

tween that Colonial housewife and the homemaker of today is the former's recipe for pomander balls. It is a pre-holiday custom in which every woman should indulge. And since many hours will pass in the making of a pomander ball, it is delightful to contemplate the story behind the fruit and spices to be used in this time-honored recipe.

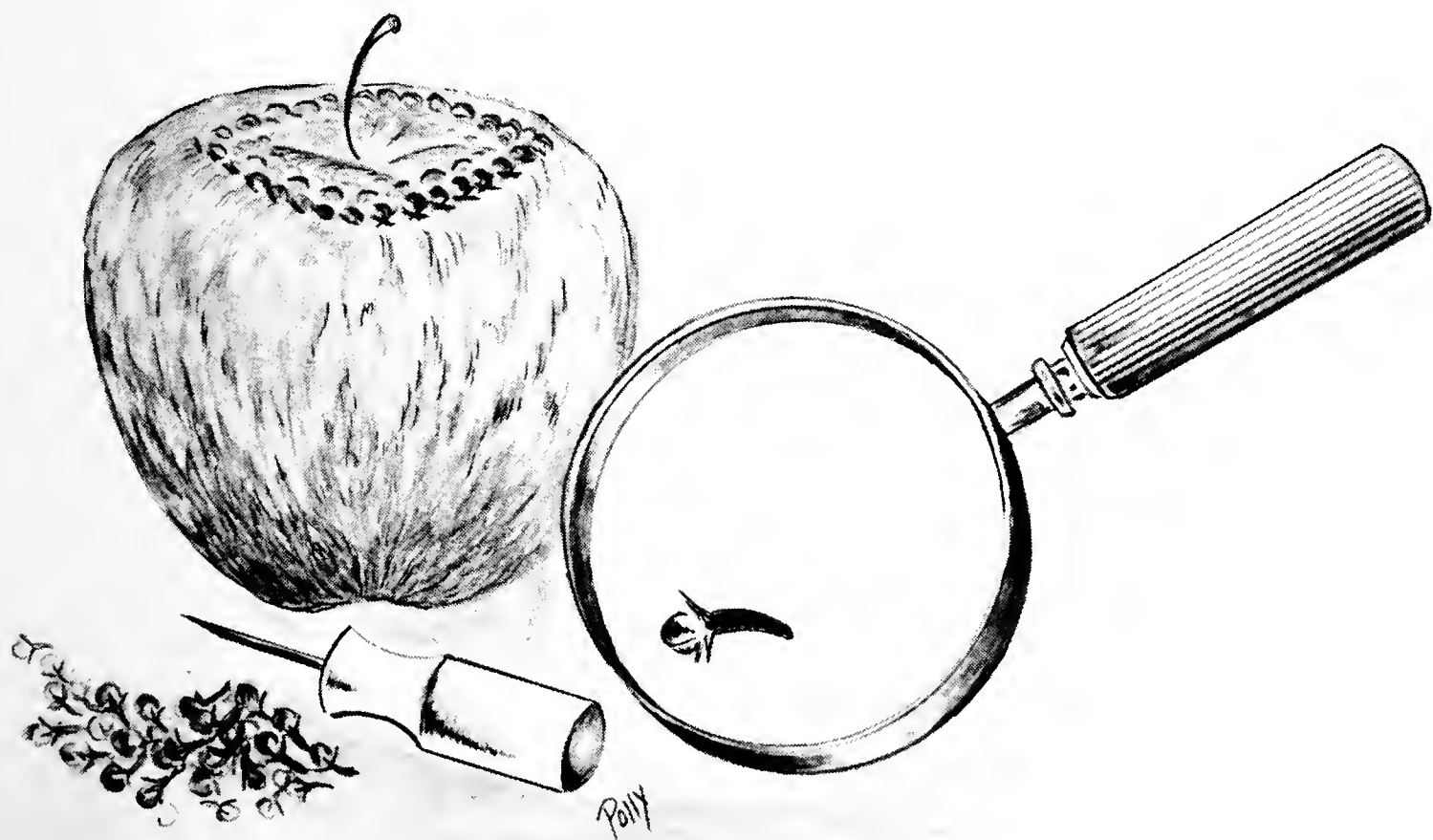
First select a sound orange, *Citrus sinensis*. It should be of medium size and thin-skinned to save the fingers. If it is not thin-skinned, a sharp nut-pick or skewer may be used to prick the rind. Look at this lovely golden ball and try to imagine our modern world without it. Brought to Europe from Southeastern Asia by the Moorish or Portuguese traders, before the fourteenth century, only the most wealthy could possibly afford pomanders using this wondrous fruit.

Next open a large box of cloves and pour them into a bowl or tray. This will simplify selection of perfect cloves with the heads intact. Check their quality as the spice merchant does. Are they plump? Good, for it shows the

flower buds were handpicked at just the right moment before the petals had opened on the calyx. Try to preserve this knob as you work, for it adds to the finished appearance of the pomander. Are the cloves unwrinkled and a purplish-brown? Excellent. They have been slowly dried in the sun, and their fragrance will last for many years. It is easy to see from their shape why they were named from the French *clou*, meaning nail.

Now it is time to stud the orange with cloves so their heads barely touch, for the fruit will shrink slightly as it cures. As the heady fragrance fills the room about you, think how excited the crew of that first trading ship must have been as they approached the Isle of Amboina in the Moluccas. It is said the spiciness of *Eugenia aromatica*, called by some botanists *Syzigium aromaticum*, carries far out to sea on the warm, moist air. Spices in those days were worth far more than their weight in gold. What a discovery!

When the orange is covered clove-to-clove, roll this ball in a bowl of



powdered orris root to fix the fragrance and preserve the fruit. Be careful every tiniest spot is covered, for it reduces shrinkage and prevents that overripe odor. It is hard to believe this violet-scented powder was once the rhizome of *Iris germanica* var. *florentina*. It has been peeled, sun dried, and stored for two years before it could be crushed into this fragrant powder. You may leave the fruit in the bowl of powder, turning the balls daily till no stickiness remains. Other authorities say to coat it well and then lay on a paper towel for a week, redusting as necessary when moisture appears.

Whenever the fruit seems quite dry, wrap it loosely in tissue and set it aside to cure for several weeks. Of course if you wish to hang the finished ball, it might be well to run a narrow ribbon through the fruit about an inch from the top. This would have to be done while the fruit is still fresh and soft. An alternative is to bind the ball with ribbons or net which may serve as a hanger.

There are many variations of spices which may be added to the orris root: cinnamon, nutmeg, allspice, angelica. Each has its merits, and only *you* can

decide on a perfect combination for yourself. The fruits, too, may vary. The apple is always easy to work with. The lemon, lime, and even the fragrant quince are old favorites.

When the fruits are very dry, try your hand at decorating them. Use ribbons and net, tiny fruits and flowers, sequins and beads. Hang them in clusters or fill a beautiful bowl with their spiciness. Henry VIII gave one to each guest on New Year's eve. It was tied with a sprig of rosemary for remembrance. Others were topped with a tiny bell to drive away the evil spirits.

If the hours grow short, and you cannot find time to make your own pomander balls this Christmas, follow your nose to the Annual Gift Shop Sale. There you will find a trayful of treasured pomander balls lovingly made by the Craft Workshop. But hurry! The Isle of Amboina lured many a ship to its shores with the heady fragrance of cloves. Customers passing the pomander workshop are already pressing their noses against the windows, hoping to buy a gift for some "fayre lady."

No arm as long,
Nor lure as strong
As spices gently wafting . . .

AMATEUR'S GUIDE FOR
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MEET THE NATIVES

M. WALTER PESMAN, 7th Ed.

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Conservatory Gift Shop.

SPIRAL BOUND. \$4.50

CHILDREN'S GARDEN PROGRAM, 1967

MRS. IRENE VITTETOE

THE Children's Garden Program began on April 18 with lectures for beginning gardeners by Dr. A. C. Hildreth. These lectures instructed the gardeners in the use of tools in the gardens, garden discipline and the germination of seeds. The lectures concluded with the assignment of the plots on May 29. In addition to the lectures by Dr. Hildreth, the advanced gardeners also met with Mr. E. A. Bibee who lectured on how plants may be started from cuttings. Advanced gardeners were assigned their plots on May 22 and began the work of preparing the soil in a 10 x 10-foot plot. When the soil was leveled the children planted their seeds, did the weeding and cultivating and harvested their vegetables as they began to produce.

The Children's Garden Fair and Graduation was held on September 9 with the presentation of certificates to those gardeners who successfully completed the program this year. Trophies were given this year to outstanding gardeners in the advanced and beginner categories.

For the beginning gardeners, first prize went to Tom McLagan, second

prize to Dixie Westerbeck and third prize to Marjorie Rubin. Honorable mention went to Jim Berenbaum, Mary Kauffmann, Ann Metzger, Matt Stone, Theresa Tamburello, Jennifer Thornton, Barbara Ward and Josephine Zirkelbach.

For advanced gardeners, first prize went to Maxine Garrett, second prize to Mia Kawakami and third prize to Linda Murray and Donna Stanley. Honorable mention went to William Garrett, Mary Kay Kenney, Mary Murray, Susan Smiley, Maria Wolf, Doreen Yamamoto and Debra Yeager.

The guest speaker for the graduation exercise was Patrick J. Gallavan, Director of Mountain Parks of the City and County of Denver. After the formalities, cookies were served in the



Exhibits at Children's Garden Fair



Left, George Rucker, beginner; center, Maxine Garrett, winner, advanced gardeners; right, Tom McLagan, winner, beginners.

garden and the parents, guests, and children viewed the exhibits.

Winners in the different classes of entries at the Garden Fair were:

BEGINNERS

1. Wayne White
2. Brad Eggeman
3. Wayne White

Honorable
Mike Eagleton
Jim Hare
Bill Harpole
Kris Yabe

ADVANCED

ART

1. Maxine Garrett
2. Billy Garrett
3. Mia Kawakami

Honorable
Joan Mosley

FLOWERS

1. Mary Kay Kauffmann
2. Forest Goody
3. Tom McLagan

Honorable
Brad Eggeman
Annie Green
Jennifer Thornton

1. Mia Kawakami
2. Joan Mosley
3. Scott Nelson

Honorable
Debbie Vittetoe
Doreen Yamamoto

BEGINNERS

1. Jim Hare
2. Barbara Stein
3. Brad Eggeman

Honorable
None

ADVANCED

BEANS

1. Helen Danahey
2. Randy Cordova
3. Doreen Yamamoto

Honorable
Helene Goldstein
Donna Stanley

GREEN BEANS

1. Tom McLagan
2. Barbara Ward
3. None

Honorable
Loretta Halsig

1. None
2. Mary Murray
3. Mary Ann Donohue

Honorable
None

BEETS

1. Wayne White
2. Marlene White
3. Kevin Vessels

Honorable
Greg Kirchhof

1. Helene Goldstein
2. Joan Mosley
3. Doreen Yamamoto

Honorable
None

BEGINNERS**ADVANCED****BROCCOLI**

1. Ann Metzger
2. Sharon Carey
3. Kevin Vessels

Honorable

Jimmy Berenbaum
George Rucker

1. Karen McShane
2. None
3. None

Honorable

Randy Cordova

CABBAGE

1. Karen Hoge
2. John Eagleton
3. Donald Ward

Honorable

Jim Hare

1. Linda Murray
2. Maxine Garrett
3. None

Honorable

None

CARROTS

1. George Rucker
2. Mary Kay Kauffmann
3. Kathy Doherty

Honorable

Sandra Stein
Don Ward

1. Donna Stanley
2. Mary Kay Kenney
3. Scott Nelson

Honorable

Mary Murray

CAULIFLOWER

1. Forest Goody
2. None
3. None

Honorable

Karen Hoge

1. Rita Pugh
2. Tracy Tempest
3. None

Honorable

None

CHARD

1. Jim Hare
2. Loretta Halsig
3. None

Honorable

None

1. Maxine Garrett
2. None
3. None

Honorable

None

CORN

1. Marlene White
2. Jim Berenbaum
3. Kenneth Ward

Honorable

Brent Eggeman

1. Karen McShane
2. Elisa Kirchhof
3. Joyce Murray

Honorable

None

EGGPLANT

1. Dixie Westerbeck
2. Patty Ward
3. Russ Pickett

Honorable

Jim Berenbaum

1. None
2. Susan Smiley
3. None

Honorable

None

ENDIVE

1. None
2. Connie Mroch
3. None

Honorable

None

1. None
2. None
3. None

Honorable

None

KALE

1. Mike Eagleton
2. Kevin Vessels
3. None

1. None
2. None
3. None

BEGINNERS**ADVANCED****LETTUCE**

1. Cynthia Treffinger
Kenneth Ward
2. Mary Kay Kauffmann
3. Ann Metzger

Honorable

None

1. None
2. Helene Goldstein
3. None

Honorable

None

ONION

1. Jennifer Thornton
2. Ken Ward
3. Patty McShane

Honorable

None

1. Linda Murray
2. Mia Kawakami
3. Doreen Yamamoto

Honorable

Maxine Garrett
Joyce Murray

PARSLEY

Not worthy of any prizes

GREEN PEPPERS

1. Jane Rockwell
2. Kathy Doherty
3. Sharon Carey

Honorable

Jennifer Thornton

1. Tracy Tempest
2. Scott Nelson
3. Maxine Garrett

Honorable

Karen McShane

HOT PEPPERS

1. Joe Reum
2. Tom Rollins
3. Rene Choury

Honorable

None

1. Billy Garrett
2. Randy Cordova
3. Mia Kawakami

Honorable

Mary Murray

RADISH

1. Eddie Goldstein
2. None
3. None

Honorable

None

1. None
2. None
3. None

Honorable

None

TOMATOES

1. Tom McLagan
2. Bob Sarlo
3. Kris Yabe

Honorable

Mike Eagleton
Ann Metzger
Marjorie Rubin
Barbara Stein

1. Mia Kawakami
2. Debbie Vittetoe
3. None

Honorable

Linda Murray

TURNIPS

1. Jennifer Thornton
2. Don Ward
3. None

Honorable

None

1. Mary Ann Donohue
2. None
3. Scott Nelson

Honorable

None

The Kiwanis Club of Denver honored the two first prize winners by presenting each with a \$5.00 check at

a luncheon meeting held at the Albany Hotel on October 18.

The garden season ended with clean-up day, Saturday, October 14, when the children cleared their plots and

harvested the remainder of their produce. Pumpkins that were grown in the community gardens were given to the gardeners who completed the clean-up of their plots.

The Children's Garden Program was supervised by a group of parents who may be credited with making the garden program a success. Those who gave their time and efforts were:



Dr. L. B. Martin, Director, Denver Botanic Gardens and Mrs. Irene Vittetoe, Head Supervisor, Children's Garden.

GARDEN SUPERVISORS

Mrs. Clay	Mrs. Nelson
Mrs. Donohue	Mrs. Phipps
Mrs. Dow	Mrs. Pugh
Mr. Goldstein	Mrs. Schopp
Mr. and Mrs. Hoge	Mrs. Smiley
Mrs. Jacobson	Mrs. Tempest
Mrs. Kauffmann	Mrs. Vessels
Mrs. Knapp	Mrs. Ward
Mr. and Mrs. Garrett	Mrs. Westerbeck
Mrs. Murray	Mrs Yabe

SUBSTITUTES

Mrs. Carey	Mr. Stone
Mrs. Eagleton	Mrs. Wolf
Dr. Hovorka	

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909 York Street, Denver, Colorado 80206

I hereby apply for membership in the Denver Botanic Gardens ☐

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Class of Membership desired: (check one)

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| <input type="checkbox"/> Regular | \$ 5.00 | <input type="checkbox"/> Supporting | \$25.00 |
| <input type="checkbox"/> Participating | \$10.00 | <input type="checkbox"/> Contributing | \$50.00 |
| <input type="checkbox"/> Sustaining | \$100.00 | | |

Name_____

Address_____

City

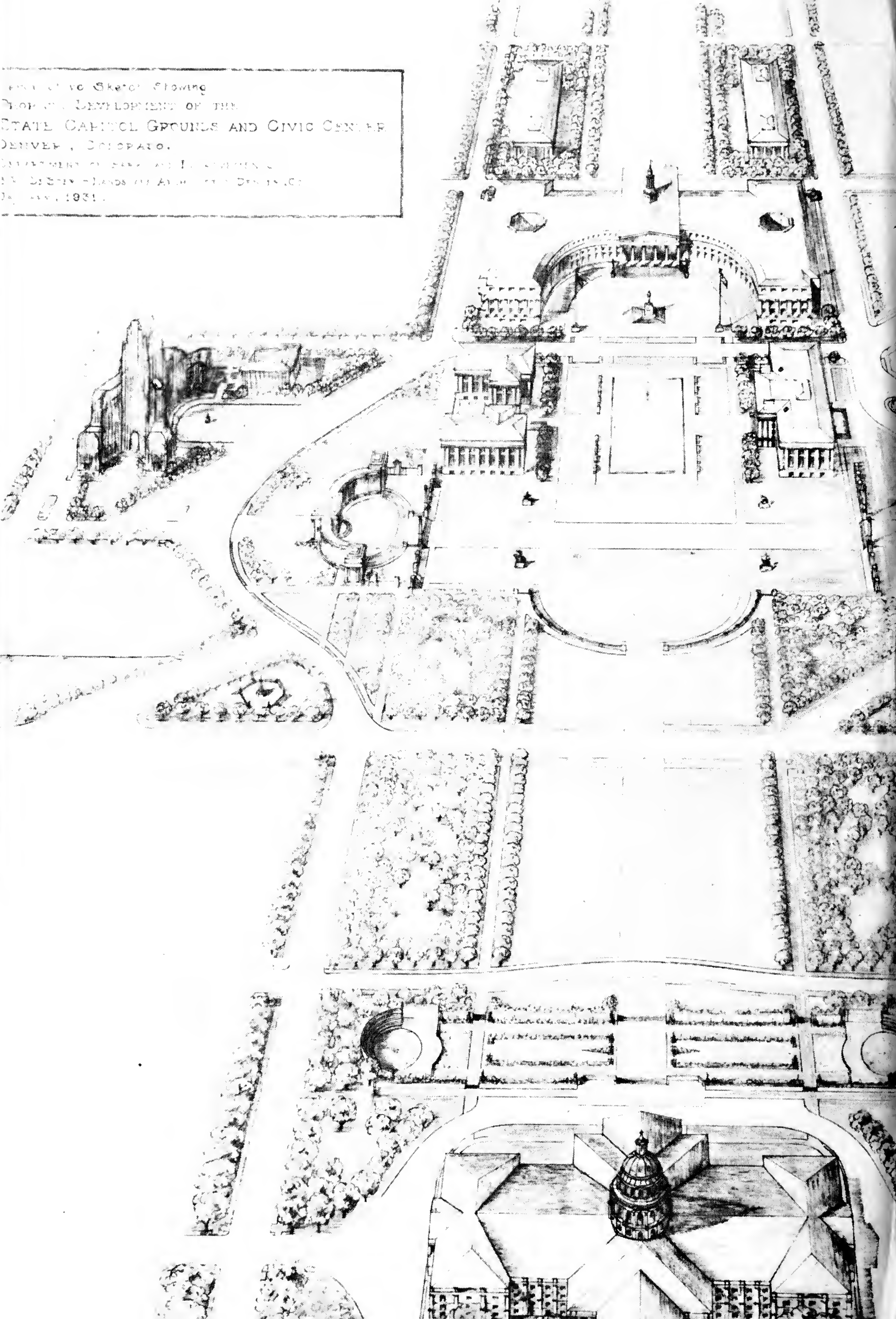
State

Zip Code



Annual Christmas Sale
DENVER BOTANIC GARDENS
GIFT SHOP
Boettcher Memorial Conservatory—South Room
Friday, December 1—Saturday, December 2
Hours—10:00 a.m. to 4:30 p.m.


Architectural Sketch Showing
Proposed Development of the
State Capitol Grounds and Civic Center
Denver, Colorado.
Department of Park and Recreation
City of Denver
Jan. 1931.



The Denver Civic Center

S. R. DEBOER

Plans



AS A PEOPLE we are very forgetful. No one today remembers the struggle Denver went through half a century ago when it purchased nearly three blocks of fully built-up property in the very heart of the city. The East Denver Park District acquired the property according to a plan drawn by Frederic McMonnies, the sculptor of the Pioneer Fountain and Monument. His plan called for a similar fountain on the opposite corner at 14th Avenue and Broadway. Robert Speer, mayor at the time, lost not a day in removing the buildings and clearing the site for development, and when he left office at the beginning of 1913 the land was clear. During the big snow which occurred later that year, a three-story high mountain of snow could be piled on it from downtown streets.

The new administration employed Olmsted Bros. (a firm of landscape architects from Boston) to plan the grounds, and the area was planted accordingly. After making a study trip to Europe, Mayor Speer was reelected by a big majority. He did not like the Olmsted plan and employed Mr. Bennett of a Chicago firm to make new plans. The present layout is very largely his plan. Marean and Norton, Denver architects, designed the Greek Theater, and Fisher and Fisher, the Voorhees Memorial.



1931 Plan for State Capitol
Grounds and Civic Center

A Joint City and State Plan

All the plans were very similar. They all proposed a new city hall on adjoining land west of Bannock Street. Olmsted had a colonnade along 14th Avenue which would have been fine. A plan for the city building was drawn up under the Stapleton administration, and a block of land acquired for it. It was at this time that it was realized that the two parks, Civic Center and Capitol Grounds, should have one plan, and the first plan for this was drawn at that time.

Governor Teller Ammons cooperated with Mayor Ben Stapleton in joining the two plans, and the vistas to the Capitol building one way and to the City Hall the other way were opened up at that time. The design of the City Hall was drawn on carefully measured profiles so the mountain view from the Capitol would be visible above the new City Hall. That is there today.

The plan at that time included a building to balance what was then the library building, connecting the two by an underground passageway to be used for shelving of books. Between the two buildings would be a reflection pool and a double row of fountains a little like the spectacular center in Pittsburgh. The plan had an attractive fountain in the axes, two ways, of the center. An argument issued over this and the type of sculpture to be used, and it was not built.

The State Park

Since the building of the City Hall, now the Courthouse, very little work has been done in the center, but much has happened to the surroundings. The library was built on a block on Broadway, and the art center on Bannock Street. The plan had contemplated a mall from the city building to Cherry Creek, but this was blocked by an extension of the Mint and other buildings.

The old library, now the water board building, does not fit any plan unless it gets a counterpart and it should be removed now. On the state park around the Capitol, the Civic Center plan was followed by the building of state office buildings on Colfax and 14th Avenues. The plan had visualized a two-level parking building under the present park and facing on Lincoln Street with a park on top. The treatment would not be unlike the St. Frances Square in San Francisco. The plan would work out so that the stilted appearance of the state building could be relieved.

An Open Mall

The main part of the 1930 plans were that the two parks were designed as one unit in the city plan. The present plans seem to ignore this. The Capitol plan as published in the newspapers would treat the Capitol grounds as a separate unit, which I believe is a serious mistake, and shows no special treatment of the grounds around the state building. The volunteer plan for the Civic Center equally ignores the fact that the two areas are one unit in the city plan. Removal of the old library building is essential, but I believe it would be a mistake to remove the Voorhees Memorial. Instead of this I would place the new city building opposite the art building.

Underground Traffic

As I said in the beginning of this article, the Civic Center was acquired to put a place of beauty in the heart of the city, something that would become a tourist attraction. The sad fact today is that the park has considerable beauty but cannot be seen. The traffic arteries around it make it impossible for a visitor to even turn his head without having a collision. In the early plans of Colfax Avenue, we planned to put the street underground. The pro-

posed plans would create underground parking under the park. From this it would be only one step to put all the fast lines — Colfax Avenue, Bannock Street, and 14th Avenue — underground and preserve the existing surface roads for sightseeing. The pro-

posal by Allen Temco in *The Denver Post* would eliminate fast traffic from the borders of the Civic Center, and I am heartily in favor of it. Together with this, we should make the park itself of such spectacular beauty that the whole West will want to see it.

Boettcher Memorial Conservatory

GUIDED TOURS

PEG HAYWARD

GUIDED TOURS of the Boettcher Memorial Conservatory are being scheduled again this year. Trained guides from the Associates of Denver Botanic Gardens, a volunteer organization, are available for the tours.

Many tours scheduled are school classes from Denver and neighboring counties. In order to make the Conservatory tours an educational experience for school groups, a committee of guides planned tours to correlate with class work in the various grade levels. A teacher's preparation guide will be sent to the teacher after a tour is scheduled. A confirmation and general information sheet will be included.

The confirmation sheet contains general information, such as procedure to be followed, purpose of the tours, and suggested preparation.

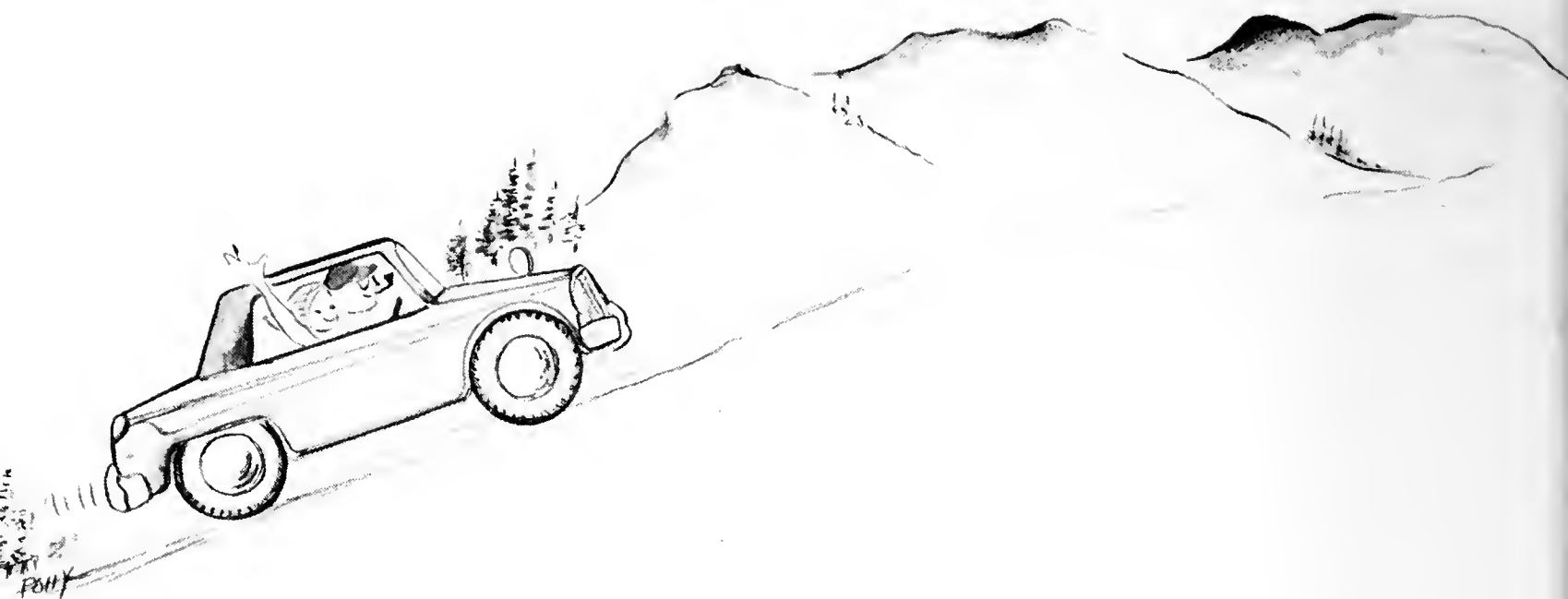
Teacher's preparation guides are made for each grade level, and contain suggestions for advance preparation of the children. Among the suggested lessons are those on how plants adapt to

environment, conservation and utilization of natural resources, trees of ancient times, and vocabulary. It is felt that the tours are more meaningful to those children who have had advance preparation.

A new method of scheduling tours for Denver and Jefferson County schools is being tried this year. The hour of 9:30 to 10:30 a.m. each weekday is reserved for Denver Public Schools tours, which are scheduled through the Department of Special Services. Jefferson County schools schedule tours through the Jefferson County Administration Office on Monday, Wednesday, and Friday of each week from 10:30 to 11:30 a.m.

Scheduling of all other groups may be arranged by calling the Conservatory Gift Shop.

The committee which prepared the teachers' materials included Mrs. Phil Hayward, Chairman of the Conservatory Guides, Mrs. Herbert Franson, Mrs. William Clifford, Mr. Frank Kerpelmann, and Mr. Larry Thompson.



Auto-Botanizing and its Thrills

M. WALTER PESMAN

DR. FRANCES RAMALEY, in his *Colorado Plant Life*, devotes a chapter to "Botany from a railway train or automobile." It is not his idea that such will take the place of the intimate botanical pleasure derived from walking. No other mode of locomotion will ever give its satisfaction. For the "modest fun" and the "bestest look," go a-foot. And take your leisurely time!

The other extreme is by plane. I, for one, am enthusiastic about the possibility of getting a bird's eye view in a general study of plant ecology. You can get the accurate information about an area's vegetation pattern in a small two-seater, flying low. Try it!

One of my most memorable plane trips was from the Hat Ranch to Kaycee, Wyoming, when a low ceiling forced us to fly within a hundred feet or so from the earth surface. I could tell each flowering plum tree, the sparse sagebrush of the ridges, and count the sheep in the meadows. I must confess that my enthusiasm was hardly shared by the pilot; he heaved a sigh of relief when we had set the plane down.

"Thank God for railways, — they are the trenches that drain our modern civilization. Avoid them by as much as a handbreadth, and you can have as much peace as will fill a nosebag." So says Hilaire Belloc. That may be true, but for viewing plant life from a train window — railroads are a snare and a delusion. Only a very experienced plant lover can recognize such large objects as pines and cottonwoods as they whiz past. For the rest an occasional gaudy splotch of color makes one wonder whether it was a field of gentians, pentstemons, or a distant pond.

Busses are baffling frustrations. Just as you recognize a choice plant, or see a wild animal in the distance, --zzz-t, you are past. And ever after, you'll be wondering what it was that caught your eye. At the next stopping place nothing is in evidence but the ubiquitous drug-store, the eating place, the standardized business-block.

Almost as disappointing, from the standpoint of getting to know the plant wealth of a region, is traveling on horseback. You are too high above the ground, and dismounting is too cum-

bersome and time consuming, especially if you are one of a larger group. Did you ever try to pick flowers, reaching down from a saddle? And I have never been able to make a horse kneel down for the purpose!

No, taking it all in all, your own automobile has the greatest potentialities. Auto-botanizing has unlimited chances for the kind of thrill that Fremont and Edwin James must have experienced.

The motorist soon develops an observation eye. Going through special landscapes it becomes more alert. It spies the blue columbine among aspens, golden banner in woodsy places or moist meadows, and it can be trained to recognize Lambert's loco, pasqueflower, and even the more uncommon things as princessplume and yellow monkeyflower. Past experiences help in knowing just where to start looking.

This well-trained observation eye gradually becomes invaluable to the auto-botanizer. Out of a landscape, seemingly commonplace and uneventful, it will spy the unusual, the unexpected.

So much for the "observation eye." Much has gone into its training before it has become expert. To distinguish the unusual from the usual, one must know what is "usual." Learning what to expect in a plant excursion by auto, is in itself an interesting, almost a thrilling experience. It is not half as difficult as many beginners might suspect.

Before long one's eye becomes accustomed to cataloguing plant associations: "here is the ponderosa pine association, — there comes the chaparral, — now we can expect the juniper-pinyon zone, — look here for columbines among the aspens," and so on, in as much detail as the "observation eye" has learned to catch.



Gardening Tips Credits

During the past year the monthly gardening tips column in the *Green Thumb Newsletter* has been the work of Bill Lucking and Bernice "Pete" Petersen.

Bill has devoted a lifetime to the study and practice of ornamental horticulture in this area, and he readily admits (perhaps too readily) that these practices change constantly. At his suggestion other authorities were consulted. Earl Sinnamon gave recommendations frequently, and your roving reporter compiled the hints. BEP

The Robert E. More

PINETUM

KATHARINE B. CRISP

AS THE autumn leaves fall and the deciduous trees grow bare, we become more aware of the evergreen trees in our parks and gardens. Pines, spruces, Douglas firs, firs, and junipers add much interest to the winter landscape. Even an arborvitae or a yew may be found in a sheltered spot.

We shall limit our comments to the junipers since numerous species can be found in City Park. South of the Museum of Natural History is located the juniper section of the Robert E. More Pinetum. Mr. More was well-known for his interest in the growing of evergreens in Colorado. So intense was this interest that he experimented with trees from many parts of the world at Glenmore near Buffalo Park, Colorado. There he demonstrated that many types of evergreens can be grown in our state.

In 1954 Mr. More gave a large selection of evergreen trees to be planted in City Park. The junipers are located south of the museum where the soil was dug up and replaced by fertile soil brought in from the Barnum Park area. The surface was graded to create four exposure slopes, and the existing pines and spruces have been drawn into the design based on the plan made by S. R. DeBoer.



View looking eastward across the Pinetum

This collection of junipers is an outstanding one, containing more than 125 trees representing 12 species and 80 varieties. Unfortunately, the trees are not labeled, but this doesn't prevent one from studying them. Perhaps some day a method of applying permanent labels will be devised. Ultimately, a bronze marker will be placed on a large stone to commemorate the donor of this valuable gift to our city.

Junipers differ from pines, spruces and firs in having berry-like fruits, awl-shaped needles in whorls of 3 or mature foliage that is scale-like. They are unusual among the evergreens in that the sexes are usually separate, and only the pistillate or fruiting trees will bear the small, round blue berries (smaller than a pea), so desirable as a display

in the fall and winter. Both male and female trees should be grown in fairly close proximity to each other. Since the flowers are minute, the distinguishing of one sex from the other (except when in fruit) presents a real problem. Trees can be transplanted in fruit, so that the sexes can be told apart if large plants are to be purchased in the fall.

Mr. More writes in his publication *Evergreens for Colorado Landscaping* (1941): "Contrary to popular belief Colorado is a very difficult place to grow many types of evergreens. Not only does the temperature frequently

go down to twenty degrees below zero or more, but more important, in the spring there are alternate freezes and thaws and a great deal of wind. Most winter-killing is due to the factors last named. An evergreen that is protected from wind and can remain in frozen ground all winter seldom suffers injury. Mulches, therefore, are not intended to keep the ground from freezing but to *keep the ground frozen*. By a 'protected location' we mean a spot on the east or north side of some structure or screen which protects from spring winds and the spring sun."



Two varieties developed from grafts of the native Colorado *Juniperus scopulorum*, Rocky Mountain Juniper.



A. *Juniperus scopulorum* 'Madorra.' A fine and unusual tree with two types of foliage on the same tree.



B. *Juniperus scopulorum* viridifolia. A pyramidal tree with bright green foliage.

Petunia

PARADE

BEVERLY PINCOSKI

A GAIN, at Denver Botanic Gardens, there was a glorious display of petunias this summer. Although the summer began on a somewhat dismal note with heavy rains and hail, by the first part of August the petunias were presenting their usual colorful show.

Each year a large area is given over to testing different varieties of these showy annuals to see which varieties are best suited to this area. This year they were grouped into three general categories. (1) New varieties — these are varieties being offered to the public for the first time. However, if some looked familiar, they may have been viewed here in previous years as trial plantings for seed companies. Also, some of these varieties, in addition to being offered publicly for the first time, are under test for various seed companies. (2) Proven varieties — these have been grown previously in the gardens for at least 3 years and have distinguished themselves as being better than other varieties for this area. (3) Test varieties — these are commercial varieties sent to us by different seed companies, strictly for test purposes, which do not fall into either of the above categories. The total number of different varieties this year was

83; 42 new varieties, 22 proven varieties, and 19 test varieties.

Testing was conducted on 54 varieties for four seed companies this summer. At the end of the growing season a brief report is furnished on the performance of each variety tested.

One must keep in mind that one year under test does not prove a variety. It can only give an indication as to its merits and should undergo further testing to be established as a good variety.

PURPLE and related colors

None of the new purple varieties can equal Black Knight for depth of color or velvety appearance. It is a dark black-purple grandiflora with 3" blossoms that do not fade in our bright sunlight. Blue Magic, which to be more accurate and descriptive should be called Purple Magic, and Capri are quite similar. In fact their new bloom color, size and petal shape are almost impossible to tell apart. Blue Magic appears to hold its dark velvety purple color better than Capri. A new introduction in the multiflora class this year is Purple Satin, which made a good showing. It has a more compact and bushy growth than any of the above varieties and retained its purple color

well though it is not as velvety.

Plum Dandy is a vibrant, velvety magenta. It is most stunning and shows off to best advantage when combined with a contrasting white variety. It was introduced a few years ago and remains unchallenged in its color class.

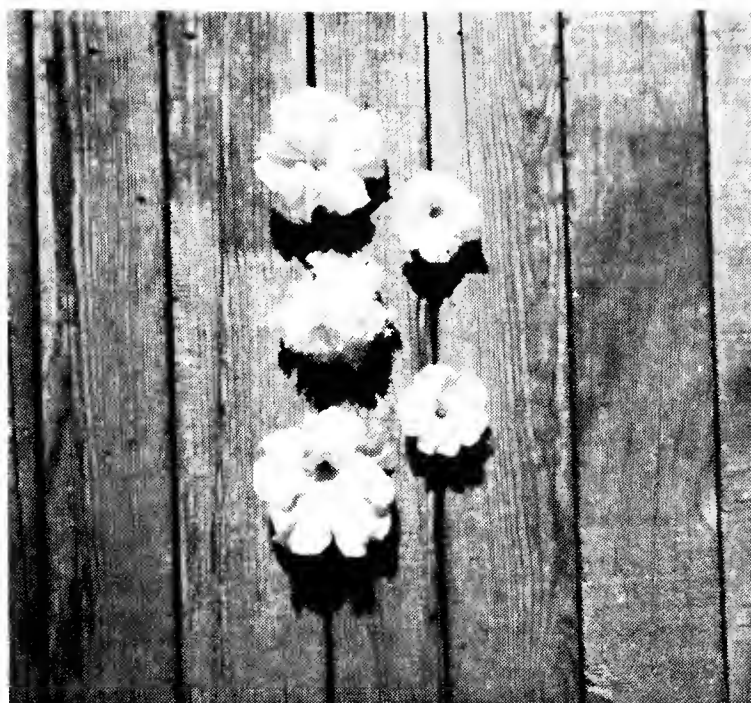
This year a relatively new color shade among petunias was introduced — lilac. Appropriately the variety is called Lilac Time. A grandiflora, with pale lilac-colored blooms, this variety still needs some improvements to be rated good. Perhaps in the future other lilac petunias will be forthcoming.

WHITE

As Black Knight remains the best of the purple varieties, so does Snowdrift remain the best of the white varieties. This multiflora variety performs very well and produces a sparkling white carpet of bloom. In the grandiflora class Seafoam and White Magic continue as the best of the large-flowered white varieties. If one prefers a large ruffled variety there is La Paloma. The blooms are a little smaller, and it has a noticeable yellow throat. The only new white variety that is worthy of note is Polar Cap. The blooms are quite similar to Snowdrift;



Petunia 'Snowdrift'



grandiflora (left) - blooms over 2" — multiflora (right) - blooms up to and including 2" — double (center) - can be either multiflora or grandiflora

however, the plants are not as bushy or as uniform in height.

YELLOW

There were no new yellow varieties this year. All the previous yellow multiflora varieties are quite similar; however, Butterscotch has a little deeper yellow color. Sunburst is the only grandiflora available. It is light yellow and the petals have a ruffled edge.

RED

The only new contender for the best red variety this year is Red Cap. It has good color, very little fading and produces a prolific amount of blossoms. In comparison with other varieties, the color is not quite as vivid as that of Comanche, which has been the best red variety for a number of years. Red Magic is also a good red petunia.

BLUE

For the most part, when varieties come onto the market bearing the word "blue" in their name or are listed as blue in color, they are usually purple. Only two varieties have an actual light blue color. They are Mercury and Blue Mist. Both fade badly in our sunlight.

To date there is nothing better to choose from.

PINK

It is rather difficult to make a choice of the best pink variety as pink petunias range in color from the faintest blush of pink to deep pink. Each distinct shade should be taken into consideration. A new variety of medium pink is Pink Foam. Except for the fact that the color fades some late in the season, it exhibited many good qualities. Another new variety that showed well is Popeye. This is a deep pink with a white throat, has small 2" blossoms, and blooms well. Chiffon is a pale pink grandiflora. Slight color variations do



Petunia 'Pink Foam'

appear. Pink Magic is a deep pink grandiflora which continues to be an excellent variety.

SALMON or coral

Salmon colored varieties have about as much variation in tone and shade as the pink varieties. Appleblossom is appleblossom pink in color and could perhaps be classed with the pink varieties, yet it differs from the true light pinks. This variety was a 1965 All-

America Selection. The color fades slightly but is not too displeasing to the overall appearance. Salmon Coronet is a new introduction this year. It is a light salmon multiflora and produces many blooms. The color fades slightly late in the season. The 'Magic' series has produced still another good variety named Coral Magic. It is a deep salmon-coral and is a prolific bloomer. Maytime is also a good grandiflora of medium salmon color.

Two new varieties worth mentioning are a little different from the usual. One is Peach Blossom which has a cream center darkening toward the outer edge of the petals to a peach-pink. The other is Cherry Blossom which has the same cream center and darkens to a medium or rose-red color. Bloom size is about 2½", and both bloom freely. Perhaps this is the beginning of a new 'Blossom' series.

SOLID COLOR with contrasting vein

Several new varieties were introduced in this category. However, none of these appeared to be good varieties. All faded badly and did not give a pleasing effect. Of the previously introduced varieties, Sugar Plum is quite showy. It is orchid with darker orchid-purple veining. Blooms are about 2", and it is floriferous.

VARIEGATED or bi-color

The greatest problem with variegated petunias is that there is seldom uniformity in the pattern. Most varieties produce a few blooms that are true, the pattern being divided equally between colors, but the remaining blossoms are either nearly all one color or the other. Two new multiflora varieties this year seem to be fairly uniform. They are Space Star Improved and Rose Star. They are quite similar, both having deep rose-pink and white blooms on

low compact plants. Of the two, Space Star Improved is more colorful. Having larger ruffled blossoms but with the same color combination is Crusader. Meteor is a red and white multiflora with a yellow throat.

DOUBLE

The best white variety still appears to be Sonata. It has large 3" blooms and is a prolific bloomer. In the salmon class Lyric appears to be the best of the current offerings, but there remains room for improvement. To date no company has introduced a good red or a good purple variety. All varieties tested have shown only an average amount of bloom with severe fading changing the original color of the new blossoms to displeasing shades. Cherry Tart remains the best variegated double. It is a rose-pink and white combination with small 2" blooms. A companion of Cherry Tart is Strawberry Tart, a red and white variegated. It is not as uniform in pattern, however, and has a tendency to produce some blooms that are nearly all red.

A new introduction this year is Blue Danube. It is a very light blue-lavender with slightly darker veining. The abun-

dant blossoms are large, and there is very little fading to detract from the overall appearance.

Also new this year is the multiflora 'Delight' series — Lavender Delight, Pink Delight, Red and White Delight and White Delight. Two of these appeared to be good. Lavender Delight is rosy lavender with slightly darker veining. It is floriferous with average bloom size of about 2½". Pink Delight is light pink in color with slightly darker veining and is quite similar to Peppermint, which is a taller variety and has a darker green foliage. The plants are more bushy but the peak bloom was later this season than for Pink Delight. The other two varieties in this series are not worthy of note.

NOVELTY

In the novelty class this year comes Miss Muffet. It falls somewhere between the single and double-flowered varieties. It has a single white blossom with a purple tuft in the center. The individual blooms are attractive, but as a mass planting it would show to better advantage by being used as an accent planting with a single dark purple variety.



Petunia 'Peppermint'



Petunia test area, Denver Botanic Gardens, 1967

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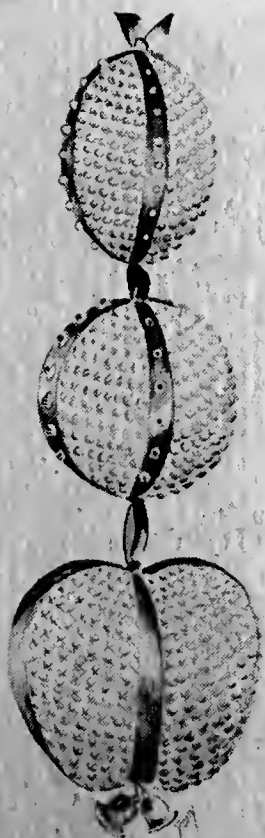
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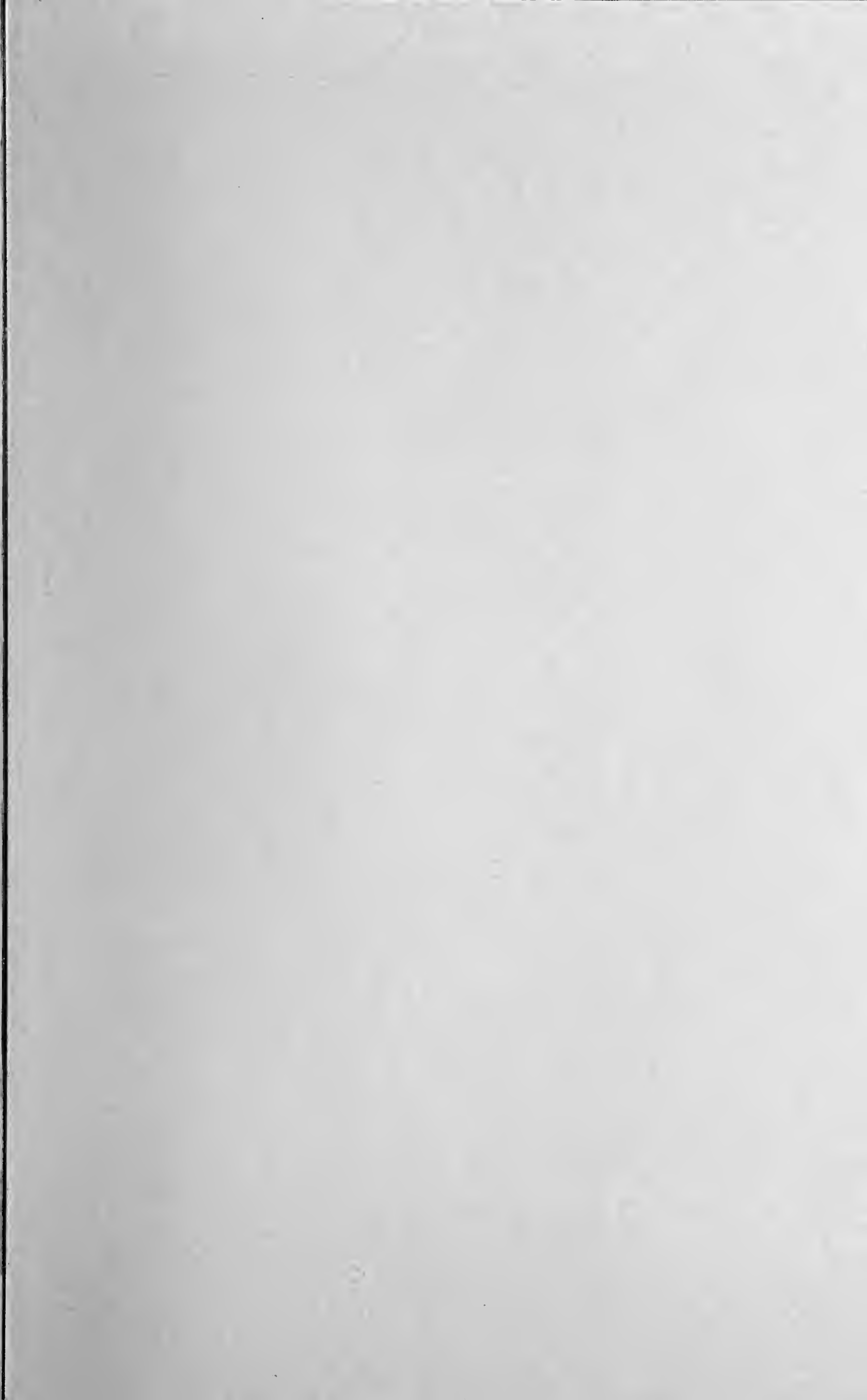
DENVER BOTANIC GARDENS

DENVER, COLORADO

This is a non-profit organization supported by municipal and private funds.

A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.





The Green Thumb

JANUARY - FEBRUARY 1968

THE COVER

Trees in Winter's Dress
Photograph Courtesy Charles M. Major

THE GREEN THUMB

VOLUME TWENTY-FIVE, NUMBER ONE

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DR. HELEN M. ZEINER AND BERNICE E. PETERSEN, *Co-Editors*

JANUARY - FEBRUARY 1968

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colo. 80206, or call 297-2547.

A Tribute to

MARY HELLRIEGEL,

Volunteer

THE QUIET WORK and intense dedication of Mary Bingham Hellriegel will be felt as long as the Helen Fowler Library is a part of the Denver Botanic Gardens.

A graduate of North Denver High School and the University of Denver School of Librarianship, Mary had been employed at the Denver Public Library and later was chief librarian at Lowry Air Force Base.

Mary came to Botanic Gardens House and the Helen Fowler Library in 1959, shortly after the former Colorado Forestry and Horticulture Association moved from its home at 1355 Bannock Street. At that time the library was comprised of about 4,000 volumes, the largest of its kind between St. Louis and the West Coast. Mary was the first professional librarian to volunteer her service on a regular basis. She expanded the classification system according to the national standards of library practice. She improved the general catalog by use of printed cards from the Library of Congress and established a uniform "call-number" lettering system. The library continued to grow through many gifts and memorials, and these new acquisitions were catalogued under her supervision. Occasionally she contributed book reviews to *The Green Thumb* magazine. Her voluntary service to the library was interrupted only by illness or vacation with her late husband, Arthur.

The chairman of the Library Committee in 1960 reported that Mary



Hellriegel had devoted two days a week to orientation and instruction in library procedure to other volunteers in order to carry on the increased work load. In the months preceding her death, in late October, she had assisted in the Conservatory Gift Shop.

Pat Gallavan, Director of Colorado Forestry and Horticulture Association when Mary began her service here, praised her work as tedious and exacting, and which could be accomplished only by a dedicated librarian.

In tribute to capable and devoted volunteers, Dr. A. C. Hildreth, on his retirement as Director of Denver Botanic Gardens, wrote that without the work of such people "he could not have operated the Gardens during their hectic 'growing-up' years. Such helpers cannot be hired or commanded. Their motivation comes from within . . . they must derive satisfaction in having contributed greatly to the development of a worthwhile institution that will outlive all of us."

Mary Hellriegel was a volunteer.

To honor her service the Mary B. Hellriegel Memorial Fund has been established. Friends and co-workers can contribute by sending checks to Denver Botanic Gardens. B.E.P.

Report of The Director

1967

INTRODUCTION

To begin, 1967 was a good year at and for the Denver Botanic Gardens. Problems we had, and irritations we had; untimely hail, snow and rain we had; delays and last minute plannings we had; apathy and spirited actions we had; some successes and some failures we had; however, the sum total of 'life as lived in a botanic garden organization' resulted in benefits for all. We think that after reading through the 1967 history that you had a hand in making, you will arrive at the same conclusion.

We have confined our remarks to what we felt were the most notable or interesting 'happenings'. It was not intended that any individual or group be slighted. Please be generous in forgiving us if in fact we forgot someone. Detailed reports by some of the volunteer organizations are to be found elsewhere in this same issue of *The Green Thumb*.

CONSERVATORY SECTION

The Boettcher Memorial Conservatory continued to be the hallmark of the Denver Botanic Gardens.

New plastic display labels, a gift of the Associates, were applied to 200 plants along the walkways. Another 200 labels will be in place early in 1968.

A collection of vine species was established using wires attached to the light poles and sides of the Conservatory, as trellis. This trick added botanical value, shaded and softened the physical aspect of light standards and walls.

Flying down to Florida in July, Ernie Bibee returned with a large collection of tropicals. Replacement of our two coconut palms (*Cocos nucifera*) was possible through the Gertrude Holwell Memorial Fund. The budget of the City and County of Denver supplied the balance of the funds. An account of the trip and brief notes about the plant species appeared in *The Green Thumb* for Sept.-Oct., 1967, authored by Peg Hayward.

Additions to the Conservatory, but not of the plant type, were: an acoustic ceiling applied to the South Room, noticeably reducing the reverberating sounds; two stone benches for the lobby; a most attractive and functional bulletin board; north and south cloakrooms secured by Dutch doors; a 20' x 30' shop area in the garage created by fencing; and, emergency electric power from the standby generator supplied to all necessary operating equipment.

YORK STREET UNIT GROUNDS SECTION

Mrs. Alexander L. Barbour provided funds for the plantings along the south side of the Conservatory. The rescinding of our 1967 capital improvement money by the City halted the completion of the entire project. A sidewalk, connecting the east and west ends of the Conservatory, was to have been built by October. A list of the plants appears in a separate section.

In pastel green stands our quonset storage unit. This was obtained late in 1967. New paint, new floor and a loading dock readied the structure for use. We now can separate the 'daily used', from the 'seldom used'.

Other intrinsic additions were: drain tile connecting Conservatory roof drains, thus stopping hillside erosion; mortarless rock retaining walls constructed at the south Gaylord entrance; over an acre of new bluegrass lawn south of the Conservatory; many loads of wood chips (courtesy of Public Service Co.) incorporated in planting area soils; one thorough clean-up in the plantings surrounding Gates Garden pool; the installation begun of redwood headers around each bed of the Guest iris collection; and, with the aid of young boys from the Juvenile Hall, much weeding and general clean-up was possible at the Lew Hammer low maintenance garden, the parking lot area and the Children's Garden.

Two pieces of equipment aided our efforts for better maintenance: a 76" Toro Professional gang mower and an eight-cubic-yard trash container. Insignificant as these two items may appear for an annual report, when one counts the man-hours saved on mowing time and the reduction of man-hours and wear on our faithful but old truck going 40 miles to the dump, one can come up with quite a saving for 12 months.

From the visiting public, we received many favorable comments on the beauty and general maintenance of the Gardens during the year.

CITY PARK UNIT

We continue to claim some 100 acres at City Park, the original site of the Denver Botanic Gardens. No changes were possible there in plantings and maintenance, a condition which has existed almost from the time the headquarters of the Gardens were moved to York Street. We received considerable free publicity regarding the Rose Garden; unhappily, no constructive criticism accompanied this rhetorical endeavor nor any material assistance.

BOTANIC GARDENS HOUSE

A new look was afforded the upstairs offices through the efforts of the House Committee of the Board of Trustees. In part, financed by the Associates, funds were provided for the complete painting of all working areas plus the hallway. Staff and visitors alike are delighted with the effect.

BOTANICAL RESEARCH

A botanical science contribution of significance was afforded the Denver Botanic Gardens by two professional amateurs. Dr. D. H. Mitchel, M.D. and Mrs. Mary Wells moved their collections of native Colorado mycological (fungi) species to the Gardens from the Denver Museum of Natural History. The laboratory equipment, the collection specimens, nearly 1700 color transparencies, some 70 technical books and all other items connected with their work have been given to

the Denver Botanic Gardens, total value exceeding \$2,500. Dr. Mitchel and Mrs. Wells will retain authority over the use of all these properties as long as they so desire. In addition, Dr. Mitchel and Mrs. Wells organized the Colorado Mycological Society, which holds monthly meetings at the Gardens, sponsors collecting field trips and numbers about forty active members.

Our number of herbarium cases was increased from four to twelve. In part they house the fungi collection; in part they allowed expansion of our native flora collections which are under the care of Dr. Helen Zeiner. The cases were purchased through funds from the Kathryn Kalmbach Memorial and Mrs. Florence W. Green's research grant to Dr. Mitchel.

EDUCATIONAL ACTIVITIES

"Mrs. Vittetoe, my pepper is hollow!" exclaimed a first-year gardener. This was recorded during the eighth year of our Children's Garden Program. Approximately one hundred twenty-eight gardeners (of these half were first-time gardeners) planted, cultivated and harvested individual 100-square foot plots of vegetables and flowers. Mrs. Irene Vittetoe was the volunteer General Supervisor. From the first planning session in March to the Clean-Up Day in October, she was everywhere in evidence. Assistance was given her through mothers and fathers, Dr. A. C. Hildreth and members of the Children's Garden Committee of the Board of Trustees; however, her concern for the entire program was primarily responsible for its success.

A first in education was the Summer Botany class of the Denver High School District conducted for eight weeks at the Gardens. Mr. Ken Mills, botany instructor, used the South Room for formal classroom sessions, the greenhouse and grounds for laboratory. Nineteen junior and senior students received class credit for this program.

Our Elementary School Conservatory Tours had a change in procedure beginning in October. Mrs. Peg Hayward, Chairman of Tour Guides for the Associates, arranged for all Denver School Tours to be scheduled through Denver's Special Services Division rather than through our Gift Shop. This was also arranged for the Jefferson County School District offices. The plan was successful and reduced our incoming calls significantly. Also, Denver schools were guaranteed one tour each morning, five days a week. Jefferson County was allotted three tours a week. This procedure made scheduling of our volunteer Guides more efficient.

To make school tours a better 'real life learning experience,' Mrs. Hayward assisted by three Tour Guides, authored two bulletins aiding the teacher. One was a general pre-tour preparation sheet. The second was an outline for the grade tour requested (3rd, 4th, 5th, or 6th). These outlines supplement the unit of study at the particular grade level, including a special vocabulary list the children will use while on tour. Their bulletins are sent to the teacher prior to the class tour at the Conservatory.

The 1967-68 Education Committee Lecture Series began with much enthusiasm. Dr. Wayne Christian, Chairman, assisted by Mrs. Alice Willis of our staff, assembled a noteworthy program of six speakers. Dr. James Feucht's "The Foreigners in Our Home Landscapes," attracted an audience of 45. The sequel, "Native Plants for the Home Landscape," by Dr. William Klein saw 68 in attend-

ance. Titles of the remaining four for 1968 are: "Those Strange Plants Called Lichens," "Mushrooms and Toadstools, Nature's House Cleaners," "Fossil Plants — A Link with the Past," and "The Creative Photographer."

In November Dr. Feucht, Extension Specialist for Colorado State University, and whose office is in the Botanic Gardens House, offered a course in Plant Propagation. Available greenhouse space limited class size to 25. This six-week session was for commercial plantsmen; however, we are considering a second session for the home owner.

SPECIAL EVENTS

April 14 through 16 found members of the Denver Botanic Gardens touring four major botanical offerings in the Los Angeles, California area. Included were: Los Angeles State and County Arboretum, Descanso Gardens, Huntington Botanical Gardens and Rancho Santa Ana Botanic Gardens. Not only was the pace fast and the educational features in quantity, but also much fun was generated and new friendships established.

The Denver Artist Guild sponsored an oil and water color art show for many months in the South Room of the Conservatory.

On Saturday, May 13, at about 1:13 p.m., we had an instant blizzard. That closed the 1967 Plant Sale. Profit to the Gardens, however, was slightly higher than 1966. Mrs. Elna Gibson, General Chairman, and her 200-plus helpers, indeed, merit our thanks for a successful sale. This is an annual Gardens event sponsored by the Associates, Guild, Around the Seasons Club and all other voluntary individuals and groups interested in the development of the Gardens.

If you think gardening is over in late July, you should have attended the Terrace and Garden Tour sponsored by the Denver Botanic Gardens Guild on July 27. The gardens and homes chosen for the tour furnished many new ideas and special garden effects for the visitors. This is also an annual event by the Guild which benefits the Gardens financially.

Three flower shows were staged in the Conservatory: Iris, Dahlias, and Orchids. Entry was open to all who grow any of these types of plants. Each show was planned and executed by the members of the particular society featured.

The American Iris Society Convention was held in Denver May 31 through June 3. It was also held here in 1963. This was quite an honor to have the Convention at the same place with so short a time between visits. The Guest Iris collection at the Gardens was in fine physical shape, although the cold spring weather produced fewer flowers than hoped for.

PUBLICITY AND PUBLIC RELATIONS

For the visitor, the Botanist-Horticulturist designed and prepared a printed guide and map to the Gardens at the York Street Unit. Approximately ten thousand of the guide pamphlets were distributed to the public. Mr. Walter Pesman's *Meet the Natives*, a spiral bound guide to native Colorado flora, was revised by a committee of: Dr. A. C. Hildreth, Dr. Helen M. Zeiner and Dr. Moras L. Shubert. This is the seventh printing and is sold at the Conservatory Gift Shop.

At the request of the May-D & F department store in downtown Denver, the Gardens participated in their "Salute to Denver" through a two-week window

display and in-store events. The Director and Mr. Bibee each gave an illustrated talk in the May-D & F auditorium.

During the year, 27 newspaper articles were published, including many pictures; eight radio programs made announcements for us; and we appeared on television six times.

THE ADMINISTRATION

The Board of Trustees experienced a number of changes in its membership during the year.

Elected to the Board in January were: Mr. Neil Roberts, Mr. William W. Mercer and Mr. John Hall. The following were elected to the Board in late 1967: Mr. William H. Hornby, Mr. Frank Shafroth, and Mr. Van Holt Garrett, Jr.

Resignations during the year were: Mr. Everett C. Long, Mr. Aksel Nielsen, Mr. Daniel L. Ritchie, Mrs. James R. Arneill, Jr., Mr. Neil Roberts and Mr. William W. Mercer.

One of the most difficult resignations to accept was that of our President, Lawrence A. Long. He did this with great reluctance, but on the orders of his doctor. Mr. Long remains a member of the Board. We know he will continue his deep interest in the Gardens' activities and contribute in a vital way to our development in 1968.

The Planning Committee of the Board, Mr. Harley Higbie, Chairman, took on two major projects. First, to have long range effects, was the search for a qualified landscape architect who can furnish the Gardens with a Master Plan. At the close of 1967, the Committee was near to announcing its choice for the position. Second, was the problem of acquiring the two vacant lots north of the site for Horticulture Hall. The future parking needs of Horticulture Hall are involved.

The City Planning office of Denver requested that the Board submit Capital Improvement plans for the years 1968-1985. Although on very short notice, some 17 projects were reported. This was a considerable task since each project required thorough details to justify its need.

THE STAFF

Early in the year, Beverly Pincoski was promoted from secretary to Botanist-Horticulturist. In April, Constance Jones was added as the Director's Secretary. Mrs. Lucille Mark was appointed Clerk-Typist II, part time. In August, David Blades assumed the duties of our Assistant Conservatory Superintendent. David formerly was associated with the New York Botanical Gardens. Dave Lankhorst was promoted, through examination, from Utility Worker I to Gardener-Florist I; Harry Covillo was promoted from Utility Worker I to III and has assumed much of our maintenance work in the Conservatory.

Unofficially, Miss Esther Holt, now of Hobart, Tasmania, is our one field staff. Miss Holt collected plants and seeds, plus sending our library a number of books from 'downunder'. We appreciate Miss Holt's voluntary services for these otherwise unobtainable materials.

Our contracted Burns' Security Guards were a most welcomed assistance. Their twenty-hour, seven-day-a-week patrolling allowed effective crowd control and reduced vandalism to a minimum.

1968 AND BEYOND

Progress results from problem solving and luck.

During 1967 we had a moderate share of solutions and luck. Only one serious setback occurred, the loss of \$10,000 capital improvement money for sidewalk construction along the south side of the Conservatory.

But what solutions will be needed during 1968 and beyond? A number of examples may serve as markers along the path we should take.

In operation for two years, the mechanical systems of the Conservatory have passed the finger-crossing method of maintenance. With no provisions available from the City, sufficient funds must be made available by the Board to insure proper inspection and repair of the equipment. Preventative maintenance is the key to low cost repair bills.

Another year without a Master Plan for grounds development prolongs the display of annuals chiefly. No additions to the experimental plantings of hardy perennials, woody vines, shrubs and trees can be made. We are not serving the public in the broadest horticultural manner for a botanic gardens.

Staff positions such as a Plant Taxonomist, a stationary engineer, a grounds superintendent and assistant to the Director are much in need. There is enough staff to maintain the status quo of previous years. However, if we are to achieve real recognition nationally and in the professional field of arboreta and botanic gardens, we must more nearly meet the professional requirements than we have to date.

More financial assistance must be provided for our Children's Garden Program and for our Library. The Children's Garden Program generally terminates with a deficit. The Library, the only one of its kind in the Rocky Mountain states, has an annual budget of less than \$1,000. One set of botanical or horticultural reference works now exceeds that amount, to say nothing for the library's keeping up to date with current literature of books and periodicals.

A very vigorous and sustained drive for new members must have high priority. The additional revenue would provide a small increase in operating funds. But more importantly, a wider audience is needed whose interests rally around the type of cultural institution we are developing.

For 1967, we cannot adequately thank the volunteers who have contributed so much time, energy and financial assistance to the Gardens. We must hope for their continued interest during 1968.

Looking beyond 1968, we see the need for real gains to be made in the organizational structure of the Gardens. These gains must consist of: (a) an increase in the number of professional and skilled staff; (b) an increase in numbers and kinds of physical structures; (c) a more nearly adequate budget for operating and maintaining Denver Botanic Gardens. Such gains are the responsibility of the Board of Trustees and the City and County of Denver.

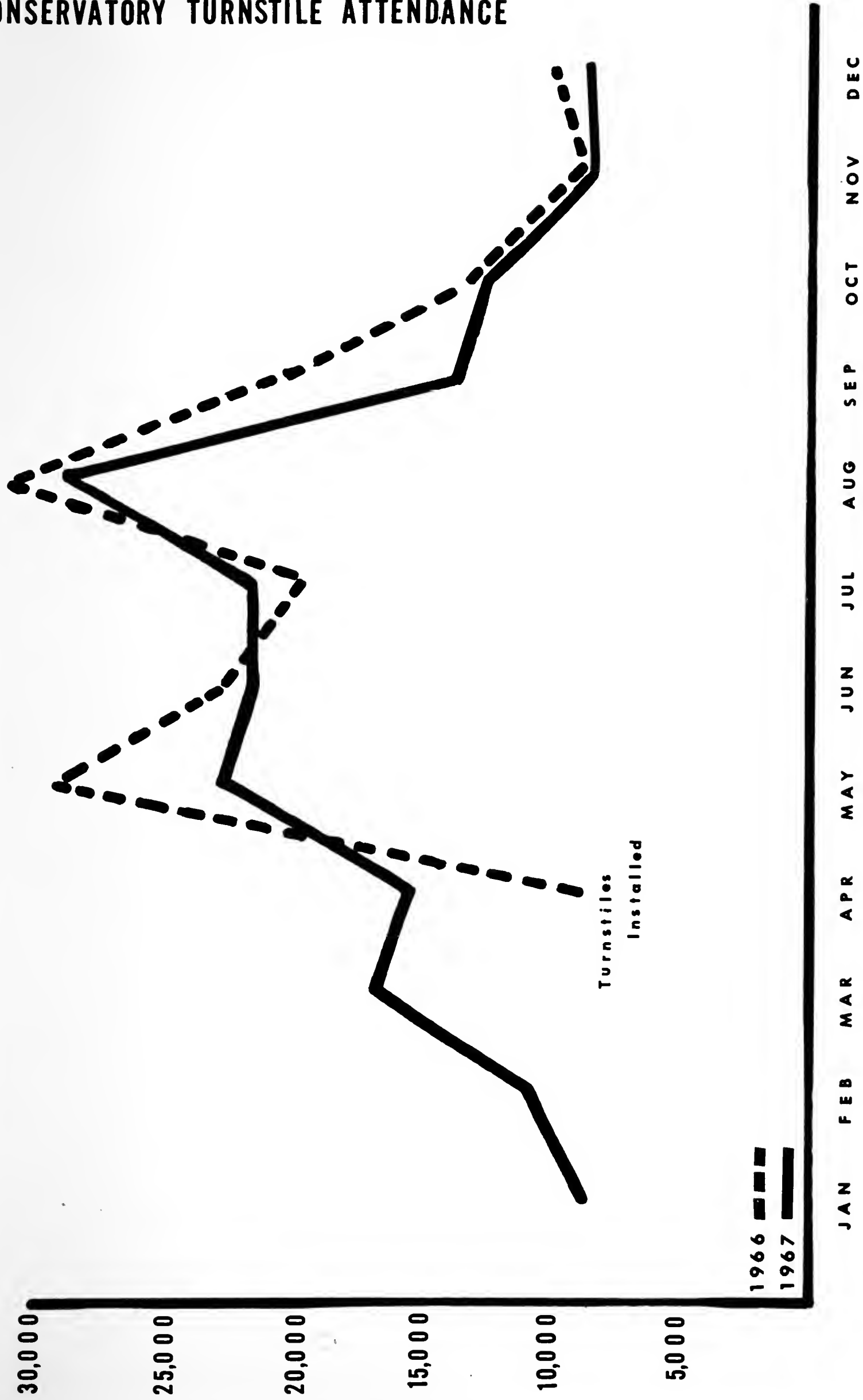
It was a privilege and a pleasure to serve as Director during 1967. We wish to thank the Officers and Board of Trustees, the Staff and all the many other individuals, without whose interest and assistance our slightest goals could not have been accomplished. We look forward in 1968 to the opportunity of carrying on the progress of the Gardens in the company of such nice people.

Respectfully,

Louis B. Martin, *Director*

January 1968

CONSERVATORY TURNSTILE ATTENDANCE



CONSERVATORY ACQUISITIONS FROM FLORIDA

<i>Aleurites moluccana</i>	<i>Dracaena</i> sp.
<i>Allamanda violaceae</i>	<i>Eugenia dicrana</i>
<i>Alocasia macrorrhiza</i> (var.)	<i>E. pitanga</i>
<i>Alsophila australis</i>	<i>Ficus panduriformis</i>
<i>Amorphophallus</i> sp.	<i>F. repens</i>
<i>Ananas comosus</i>	<i>Fortunella japonica</i> (Meiwa)
<i>Annona squamosa</i>	<i>F. japonica</i> (Nagami)
<i>Antigonon leptopus</i>	<i>Heliconia rostrata</i>
<i>Beaucarnea recurvata</i>	<i>Hibiscus</i> sp. (carnation flowered)
<i>Begonia</i> sp.	<i>Hyophorbe verschaffeltii</i>
<i>Belamcanda chinensis</i>	<i>Ixora</i> sp. (white)
<i>Beloperone guttata</i> (yellow)	<i>Jacaranda</i> sp. (dwarf)
<i>Bignonia magnifica</i>	<i>Jaquinia</i> sp.
<i>Bixa orellana</i>	<i>Jatropha</i> sp. (pink)
<i>Brunfelsia americana</i>	<i>J. multifida</i>
<i>Bulnesia</i> sp.	<i>J. podagrica</i>
<i>Byrsonima crassifolia</i>	<i>Kopsia</i> sp.
<i>Canella winteriana</i>	<i>Leea coccinia</i>
<i>Capsicum</i> sp. (Bird's Eye Pepper)	<i>Lonicera</i> sp. (Cuban Honeysuckle)
<i>Capsicum</i> sp. (Purple Pepper)	<i>Lucuma nervosa</i>
<i>Casimiroa edulis</i>	<i>Lysiloma</i> sp.
<i>Cassia fistula</i>	<i>Manihot esculenta variegata</i>
<i>Chamaedaphne</i> sp. (Leather Leaf Fern)	<i>Maranta arundinacea</i> (var.)
<i>Chamaedorea</i> sp.	<i>Murraya exotica</i>
<i>Chrysophyllum cainito</i>	<i>Pachira elliptica</i> (pink)
<i>Cinnamomum camphora</i>	<i>Pandorea ricasoliana</i>
<i>Citrus grandis</i>	<i>Passiflora quadrangularis</i>
<i>C. limetta</i> (Rangpur Lime)	<i>Platycerium</i> sp. (Elk's Horn Fern)
<i>C. limonia</i> (Sweet Lemon)	<i>Plumeria acuminata</i>
<i>Clerodendron</i> sp.	<i>Punica granatum</i> (dwarf)
<i>Coccolobis uvifera</i>	<i>Rhoeo discolor</i> (var.)
<i>Cocculus laurifolius</i>	<i>Solanum</i> sp.
<i>Cocos nucifera</i>	<i>Synecanthus angustifolius</i>
<i>Colocasia esculenta</i>	<i>Synsepalum dulcificum</i>
<i>Conocarpus</i> sp. (Green Buttonwood)	<i>Tabebuia</i> sp.
<i>Conocarpus</i> sp. (Silver Buttonwood)	<i>T. argentea</i> (Gold Tree)
<i>Cordia sebestena</i>	<i>Tamarindus indica</i>
<i>Costus</i> sp.	<i>Thespesia</i> sp. (Seaside Mahue)
<i>Crescentia cujete</i>	<i>Thrinax parviflora</i>
<i>Cydista</i> sp. (Garlic Vine)	<i>Thryallis</i> sp.
<i>Cyperus</i> sp. (dwarf)	<i>Thunbergia grandiflora</i>
<i>Cyrtomium falcatum</i>	<i>T. grandiflora</i> (blue)
<i>Datura arborea</i> (salmon)	<i>Tibouchina</i> sp.
<i>Dicksonia fibrosa</i>	<i>Triplaris americana</i>
<i>Dillenia indica</i>	<i>Wedelia trilobata</i>
<i>Dipladenia splendens</i>	

VINES ESTABLISHED IN THE CONSERVATORY

<i>Asparagus falcatus</i>	<i>Lonicera sempervirens</i>
<i>Clerodendron splendens</i>	<i>Passiflora</i> sp. (unknown)
<i>Fatshedera lizei</i>	<i>P. edulis</i>
<i>Hiptage benghalensis</i>	<i>P. caerulea</i>
<i>Holmskioldia sanguinea</i>	<i>Scindapsus aureus</i>
<i>Jasminum gracile</i>	<i>Stenochlaena tenuifolia</i>
<i>J. multiflorum</i>	<i>Syngonium podophyllum</i>
<i>J. sambac</i>	<i>Trachelospermum jasminoides</i>
<i>Lantana montevidensis</i>	<i>Wistaria sinensis</i>

YORK STREET SECTION GROUNDS PLANTINGS

1. Grape species and number of each — Donor: Dr. Moras L. Shubert

Carman 10	Niagara 20
Catawba 10	Seedless Concord 10
Concord 10	Seibel F. H. 10
Delaware 10	Steuben 10
Fredonia 10	Thompson Seedless 10
Interlaken 10	
2. Planting south of Conservatory — Donor: Mrs. Charlotte Barbour

<i>Juniperus scopulorum</i> "Gray Gleam"	10
<i>Prunus cistena</i>	33
<i>Juniperus sabina tamariscifolia</i>	155
3. Gladiolus 'Kelly Girl,' 1500. Donor: Mr. Ray Tillery, Kelly Services
4. Incense cedar. Donor: Mrs. C. E. Burt
5. Hardy hibiscus, 3. Donor: Col. R. Hargreaves
6. *Crataegus* sp., 3. Donor: Aero-Buehler Mayflower Co.
7. Maxwell Honey Locust. Donor: Mrs. Jackson Thode
8. Annual Display (pink/white petunias): Mark V. Sulzbach Memorial Fund
9. Annual Display (mixed): W. W. Dresskell Memorial Fund
10. Number of plants for test and display:
 - Geraniums, 13 varieties, display
 - Pelargoniums, 7 varieties, display
 - Snapdragons, 26 varieties, display — 1 variety, test
 - Petunias, 84 varieties, general test, of these
 - 54 varieties were tested for four seed companies
11. Total number of transplants handled: 31,800
12. Total number iris varieties readied for Guest Iris Collection at time of 1967 Convention: 1,008.

ADDRESSES BY STAFF

1. Ernest Bibee:

Garden Clubs (4) — Tropical plants, illustrated
 May-D & F Department Store — Conservatory tropicals, illustrated
 Denver High School Botany Class — Plant propagation
 Associates of Denver Botanic Gardens — Plant Propagation
 Children's Garden Program — Plant propagation

2. Louis B. Martin:

Swingle Study Group — Air Pollution Research
 Denver Botanic Gardens Guild — Denver Botanic Gardens
 Associates of Denver Botanic Gardens — Basic Botany, six lectures
 American Society of Landscape Architects, Colorado — Plans for Denver Botanic Gardens
 Colorado Nurserymen's Association — Denver Botanic Gardens
 Colorado State University Extension, Metro College — Plant Development, six lectures
 Denver Botanic Gardens Annual Membership Meeting — Future of Denver Botanic Gardens
 Civic Garden Club of Denver — Denver Botanic Gardens
 Park Hill Garden Club — Denver Botanic Gardens
 Denver Public Library Assn. — Denver Botanic Gardens future
 Men's Garden Club of Denver — Denver Botanic Gardens future
 Education Committee Series — Denver Botanic Gardens future
 The Garden Club of Denver — Denver Botanic Gardens future
 Morning Bells Garden Club — Denver Botanic Gardens future
 Crestmoor Park Garden Club — Denver Botanic Gardens future
 Fine Arts Garden Club — The Modern Botanical Gardens
 May-D & F Department Store — Denver Botanic Gardens
 American Horticultural Congress — Moderator for Educational Panel,
 "The Skilled Plantsman Gap".

3. Beverly Pincoski:

Denver High School Summer Botany Class — Role of a Botanist-Horticulturist

NEWS COVERAGE

<i>Newspaper</i>		<i>Radio</i>	<i>TV</i>
Jan. 1	North American Gladiolus Council met in Denver		
Jan. 26	Three members added to Board of Trustees (pictures)		
Jan. 31	Annual membership meeting in Conservatory (pictures)		X
Feb. 16	Lecture on Botanic Gardens of Europe	X	
Feb. 27	Notice of rules, signs, time changes at Denver Botanic Gardens		
Mar. 15	Announcement of Children's Garden registration		
Mar. 21	Dr. Martin's lecture on Denver Botanic Gardens	X	
Mar. 27	Plant Sale (first news release)		
Apr. 12	Easter lily memorial in Boettcher Memorial Conservatory		
Apr. 19	Plant Sale (special cactus story with picture)		
Apr. 21	Plant Sale (second news release — general)	X	X
May 2	Book review: "Meet the Natives" (picture)		
May 11	Lecture on India, Japan, etc.	X	
May 23	Annual Convention American Iris Soc., Denver (pictures)		
May 29	Lecture, "Colorful Colorado"	X	
July 3	Picture and descriptive material on plant shipment from Florida		
July 19	Summer High School Botany Class (pictures)		
July 20	Descriptive brochure of summer plantings and map		
Aug. 17	Dahlia exhibit, state-wide, in Conservatory		X
Aug. 29	Addition of David Blades as Asst. Cons. Supt.		
Sept. 1	Announcement of 1967-68 lecture series		
Sept. 9	Children's Garden Graduation Ceremony (pictures)		X
Sept. 25	First lecture in 1967-68 series	X	
Oct. 10	Feature story: Dr. Martin's election to boards of two botanical and horticultural organizations		
Oct. 27	Associates hold annual meeting		
Nov. 1	Second lecture in 1967-68 series	X	
Nov. 14	Annual Associates Christmas Gift Sale (pictures)	X	X

School Tours of the Conservatory conducted by the Tour Guides of the Associates of Denver Botanic Gardens.

School Year, September, 1966 - June, 1967

DENVER SCHOOL DISTRICT

Elementary Grades

Name of School	Number of Children	Name of School	Number of Children
Ashgrove	163	Harrington	47
Ashland	126	Knapp	63
Beach Court	27	Knight	93
Belmont	31	Lincoln	105
Berkeley	28	McKinley	8
Boulevard	36	McMeen	69
Brown	53	Mitchell	281
Cheltenham	94	Moore	19
College View	97	Munroe	120
Colfax	71	Park Hill	35
Columbine	78	Philips	33
Cory	154	Pitts	96
Elbert	96	Remington	54
Ellis	67	Schmitt	37
Elmwood	24	Smith	148
Emerson	27	Steck	60
Fairmont	93	Stevens	22
Fairview	165	Swansea	46
Fallis	15	Thatcher	70
Force	39	Washington Park	67
Gilpin	131	Westwood	89
Godsman	33	Whiteman	33
Goldrick	32	Whittier	96
Greenlee	136	Wyatt	36
Hallett	56	Wyman	17

Junior High Schools

Baker	128	Morey	43
Cole	104	Smiley	48
Kepner	36	Grant	53

High Schools

East	27	South	52
Kennedy	53	Thomas Jefferson	113
Manual	49	Other Denver Schools	170
North	63		

Parochial Schools

Lutheran	80	St. Anthony	45
Holy Trinity	33	Mary Crest High	14
St. Josephs	30	Cathedral High	16
St. Johns	36	Total number of children	4891

JEFFERSON COUNTY SCHOOL DISTRICT

Elementary Grades

Campbell Elementary	60	Parmalee	35
Fremont Elementary	30	Peck	26
Fitzmorris	93	Pennington	60
Foster	55	South Lakewood	120
Green Mountain	31	Slater	50
Lasley Elementary	124	Swanson	155
Juchem	60	Welchester Elementary	30
Maple Grove	86	West Lakewood	33
North Alameda	105	Jefferson County	27
North Lakewood	32	Total number of children	1560
Mitchell	270		

School Year, September 1967 - December 1967

DENVER SCHOOL DISTRICT

Elementary Grades

Name of School	Number of Children	Name of School	Number of Children
Asbury	71	Knapp	63
Belmont	27	Knight	94
Berkeley	66	Lincoln	42
Boettcher	15	Mitchell	57
Bradley	32	Sabin	34
Bryant-Webster Elementary	102	Slavens	32
Carson Elementary	94	Steck	37
Denison	32	Stevens	31
Fairmont	53	Swansea	101
Fairview	63	Thatcher	37
Gilpin	72	University Park	189
Godsman	63	Valverde	12
Gust	103	Westwood	98
Harrington	25	Whittier	42

Junior High Schools

Baker Jr. High..... 137

High Schools

Manual High	69	South High	29
North High	28	Total number of children	1967

JEFFERSON COUNTY SCHOOL DISTRICT

October through December 1967

Elementary Grades

Name of School	Number of Children	Name of School	Number of Children
Bear Creek	188	Johnson	67
Belmar	125	Kullerstrand	16
Central Lake	54	Miller	13
Coal Creek	31	Pleasant View	75
Columbine Hills	125	Secrest	180
Edgewater	46	South Alameda	204
Fairmont	120	South Lakewood	64
Fremont	172	Swanson	125
Green Mountain	112	Total number of children.....	1710

Miscellaneous Guided Tours for Children

Kindergarten level	121	Pre-School level	16
Head Start Program.....	168	Ridge School	36

Other Guided Tours, September through December 1967

Arapahoe teachers	20	Brownies	24
Senior Citizens, Ft. Collins.....	30	Cub Scouts	12
North School, Englewood.....	26	Arvada Pre-school mothers.....	15
Town Planners, Great Britain and Irish Republic	90	Girl Scouts	26
Women's Grange group.....	15	County Clerk Deputy Conv.....	65
Denver General Hospital.....	15	Girl Scouts	28
Theta Sigma Phi.....	10	Boy Scouts	10
North Elementary, Englewood.....	28	Brownies	20
National Jewish Hospital.....	16	Blue Birds	11
Brownies	24	Merritt Hutton High (Thornton)....	13
Randall Craggs School	10	6th Annual Conv. Elementary Schools	15
Village Heights Elementary (Arapahoe)	30	Cohl Elementary (Boulder Valley)...	33
Castle Rock School.....	17	Camp Fire Girls.....	17
Walt Whitman (Arapahoe).....	57	Blue Birds	9
Mark Hopkins Elementary (Arapahoe)	63	Brownies	11
Mount Airy Hospital.....	16	Ft. Logan Hospital.....	24
Blue Birds	21	Ft. Logan Hospital.....	40
Cub Scouts	10	Brownies	25
Sheridan Jr. High.....	34	Cub Scouts	15
		Cub Scouts	12
		Total number of individuals.....	957

GRAND TOTALS

September, 1966 through June, 1967 (10 months)

- (1) Total number of persons given guided tours through the Conservatory.....13,112
- (2) Total number of Denver Schools..... 62
- (3) Total number of Jefferson County Schools..... 20

September, 1967 through December, 1967 (4 months)

- (1) Total number of persons given guided tours through the Conservatory..... 4,634
- (2) Total number of Denver Schools..... 32
- (3) Total number of Jefferson County Schools..... 17

Third Annual Report

Associates of Denver Botanic Gardens

Flexibility and *cooperation* — these are the watchwords of the Associates. Within the framework of the by-laws of the Associates, “The purpose of this organization shall be the betterment of Denver Botanic Gardens by physical aid and financial assistance.” As the needs and emphasis of Denver Botanic Gardens shift to assure a healthy growth, so the work of the Associates has been adapted to meet these changing needs. During the past year, many jobs have been completed and others barely begun. This report will adhere strictly to major tasks undertaken in the name of the Associates. It would be difficult to delineate all the separate contributions our Associates have made and continue to make as members of the Library Committee, Editorial Committee, Education Committee, Herbarium Committee, and other similar committees appointed by the Board of Trustees of Denver Botanic Gardens.

At the Third Annual Meeting of the Associates held in the South Room of the Conservatory on October 26, 1967, it was apparent three commitments continue to absorb the major proportion of our efforts. These include the Conservatory Guides, the Gift Shop, and the Arts and Crafts Workshop.

The Conservatory Guide Committee, under the expert leadership of Mrs. Phil Hayward, involves twenty-nine regular and six alternate Guides. During the school year, tours are scheduled seven days a week from 10:00 a.m. to 4:00 p.m., Monday through Saturday; from 7:00 to 9:00 p.m. on Friday evenings; from 2:00 to 4:00 p.m. on Sundays. During the summer months, Guides were available during these same hours, but tours were scheduled only by special arrangement. This less demanding schedule allowed Guides to devote more time to their families.

The number of individuals served by Guides increased from 342 in September, 1966, to 3,892 in May, 1967, with an impressive total of 13,112 persons. Over one-half this number were school classes. Garden clubs, church groups, conventions, home demonstration clubs, Campfire Girls, scouts and similar groups comprised the remaining number. Members of the American Iris Society, special visitors from Africa, the Western Regional Conference of the Council of State Governments, and the Town Planners of Great Britain and Irish Republic were among the special summer visitors served.

An intensive study of school needs was made, and an improved system of scheduling tours and guide programs resulted. Under Dr. Louis Martin's direction, a committee of Guides completed a series of specialized tours correlated with classwork at various grade levels. Teacher preparation guide sheets, vocabulary lists, and general information sheets plus a confirmation sheet sent to each teacher scheduling a tour have done much to increase the efficiency of the Guide program.

Beginning in September, Denver Public School scheduling is done exclusively by the coordinator of the Special Services Department, who supplies this same service for the Denver Museum of Natural History, the State Historical Society of Colorado, and the Denver Zoo. Each weekday, the hour of 9:30 to 10:30 a.m. is reserved for Denver Public School tours, and on Monday, Wednesday, and Friday, the hour of 10:30 to 11:30 a.m. is reserved for Jefferson County Schools. This has greatly reduced the telephone load formerly carried by the Gift Shop workers in charge of scheduling all tours.

The Guides make every effort to increase their knowledge of established conservatory plants and are alerted to all new plantings. During the winter months, Dr. Louis Martin, Dr. Hugh Pote, Dr. James Feucht, and Dr. Helen Zeiner conducted a series of 12 two-hour classes in basic botany for members of the Associates. Twenty-five Guides attended a total of 198 class sessions. It is the sincere hope of the Associates this series may be continued during the coming year.

In January 1967, Mrs. Charles V. Petersen assumed chairmanship of the Gift Shop Committee. She increased the trained staff to 28 persons including the special committee of five members. The Gift Shop assumes all Associate expenses such as mailing, badges, entertainment, and office supplies. It has also made possible the purchase of new tables for use in the Conservatory, some redecorating in Botanic Gardens House, additional volumes for the library, Christmas decorations for the Conservatory, the new permanent labels on plants in the Conservatory, and similar projects.

A complete revision of shop procedures has been instigated with excellent results. Workers must master a greatly increased and constantly changing inventory, the value of which now approaches \$4,200.00. The Gift Shop maintains a seven-day-week schedule with hours from 10:00 a.m. to 4:00 p.m. on Monday through Saturday, and from noon to 4:00 p.m. on Sunday. In addition to duties of a salesperson, each Gift Shop worker must act as official greeter and hostess for all persons entering the Conservatory, provide efficient secretarial service for in-person and telephone messages, book Conservatory tours, and help maintain the neat appearance of the Gift Shop. It is a very complex and demanding job, often revealing heretofore untapped talents of our Associates.

The Gift Shop also shouldered the responsibility of maintaining the Botanic Gardens' booth at the Colorado Garden and Home Show in February. Sixteen Associates manned the booth and promoted goodwill for the Gardens by handing out plant sale fliers, encouraging people to visit the Gardens, answering all sorts of questions, and selling Gift Shop items.

Mrs. J. V. Carroll was Chairman of the Arts and Crafts Workshop Committee. This group continues to meet the first Thursday of each month in the main room of the Botanic Gardens House. At this time they concentrate on making items designed specifically for sale at the Gift Shop, either for seasonal items or for the Annual Christmas Sale. Associates attending this workshop are, for the most part, a devoted handful of women whose combined talents do much to retain the unusually high standard of original and handcrafted items offered to Gift Shop customers. Other unscheduled workshops are held as needed in members' homes.

One Associate project completed during this year was that undertaken by our hard working Greenhouse Committee under the chairmanship of Mrs. Graham Morrison. An extensive clean-up of hundreds of plants designated for plant

sale use was completed by the end of May, 1967. At that time this committee was phased out in cooperation with Dr. Martin's re-organization policies.

This was a tremendously rewarding year for all the Associates, especially your outgoing President. The prospect of even greater challenges looms large for our incoming President, Mrs. Hayes W. Neil. This entire group continues to embody a rarely-found enthusiasm and devotion to duty which makes each membership a privilege. The continued success of the Associates stems, we feel sure, from the excellent spirit of cooperation given us by our Director, Dr. Louis Martin, and his entire staff.

As my year of leadership closes, may I thank each Associate for the thoughtful dedication with which you have accomplished your work thus far. May this coming year see even more goals completed for "the betterment of Denver Botanic Gardens."

AVALONNE KOSANKE,
Retiring President



Annual Report

As the seasons continue their cycle, so dedicated members of Around the Seasons Club continue to serve Denver Botanic Gardens.

Efforts of the club's members are deeply involved in the standing committees appointed by the Board of Trustees and intertwined with activities of Associates of Denver Botanic Gardens. Chairmen of the Editorial Committee and the Herbarium Committee are members of Around the Seasons. The president of the Associates, the Arts and Crafts Workshop chairman and Tour Guide chairman are also members of Around the Seasons.

With the increasing growth of the Annual Plant Sale the club cannot be identified with one particular project. Yet its 30 members consider the plant sale as their major annual activity. Last spring Around the Seasons' members served as special assistants to the plant sale chairman and as buyers, truckers, diggers and sales personnel in the booths that handled annuals, perennials, geraniums, house plants, ground cover and rock garden plants, trees and shrubs. Every active member *worked*.

They serve regularly on the Herbarium Committee, the Education Committee, the Editorial Committee and the Library Committee. For example, their editorial contributions during the past year were: Club members produced 22 articles and 42 illustrations for *The Green Thumb* magazine, compiled monthly gardening tips for the *Green Thumb Newsletter*, participated in updating and revising the seventh edition of M. Walter Pesman's *Meet the Natives*, and revised the special "Conservatory Issue" of *The Green Thumb*.

As Associates many are active in the Tour Guide program, the Gift Shop and the Arts and Crafts Workshop. In addition, Around the Seasons, as a club project, sold dried plant materials and produced "What Cone Is This?" (a decorative plaque useful in identification of native cones) as part of the Gift Shop's recent Christmas sale.

Study under competent teachers has been the reward for membership in Around the Seasons. Here, Dr. Helen M. Zeiner presents regular lessons in ecology and botany. In the field, Mrs. Katharine B. Crisp and Dr. Zeiner are guides in identifying native and introduced plants. Highlights of the club year were talks by Dr. John D. Johnson, "Plains Conservation Center"; Ruth Ashton Nelson, "English Gardens"; Dr. Louis B. Martin, "Los Angeles Arboretum"; and Dr. John Long, "Native Orchids of Colorado."

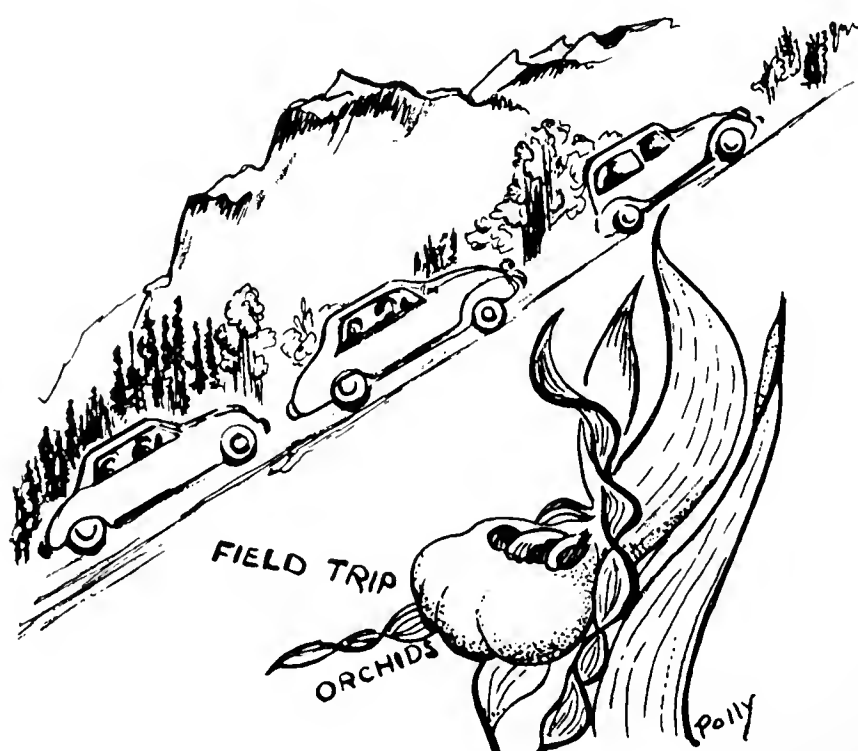
Climax of the year's program was a field trip, led by Dr. Long, to see orchids in their native habitats.

In the name of the club 36 trays and a chalk board with easel were gifts for use at Botanic Gardens House.

In January 1968 Around the Seasons Club begins its eighth year, or twenty-ninth season, in study and service.

PAULINE R. STEELE, *Retiring President*

BERNICE E. PETERSEN, *Program Assistant*



Denver Botanic Gardens Guild

Annual Report

The Denver Botanic Gardens Guild had a successful seventh year. With a capacity membership of 40, it is an active, learning group of young women.

With the growing interest in herbs, our Herb Booth at the Annual Spring Plant Sale is increasing in popularity. We were successful in selling over 2,500 herb plants this year.

The formal herb garden at the south side of Denver Botanic Gardens is the Guild's chief project. With the lovely statue of the "Boy and Frog", the Herb Garden is a point of interest for the many visitors to Botanic Gardens. Again this year the Herb Garden has been planted and maintained by the members of the Guild. Plans are now being made to complete the undeveloped section.

We were gratified by the response to the vinegar sales in 1966 and the proceeds totaled \$300. The profit from the vinegar sales is used to plant and expand the Herb Garden. Hopefully, by increasing our production of vinegar this year we can complete the Herb Garden. At this time orders for herb vinegar have exceeded last year's.

The Annual Garden Tour in July was well attended and the gardens were lovely in spite of a cold, wet summer. More than 500 people attended the tour and enjoyed the box suppers at the Gardens. The \$1800 earned from the tour was given to the Board of Trustees for the general fund of Denver Botanic Gardens.

We are looking forward to another productive and enjoyable year.

GLORIA FALKENBERG, *President*

Denver Botanic Gardens Lecture Series

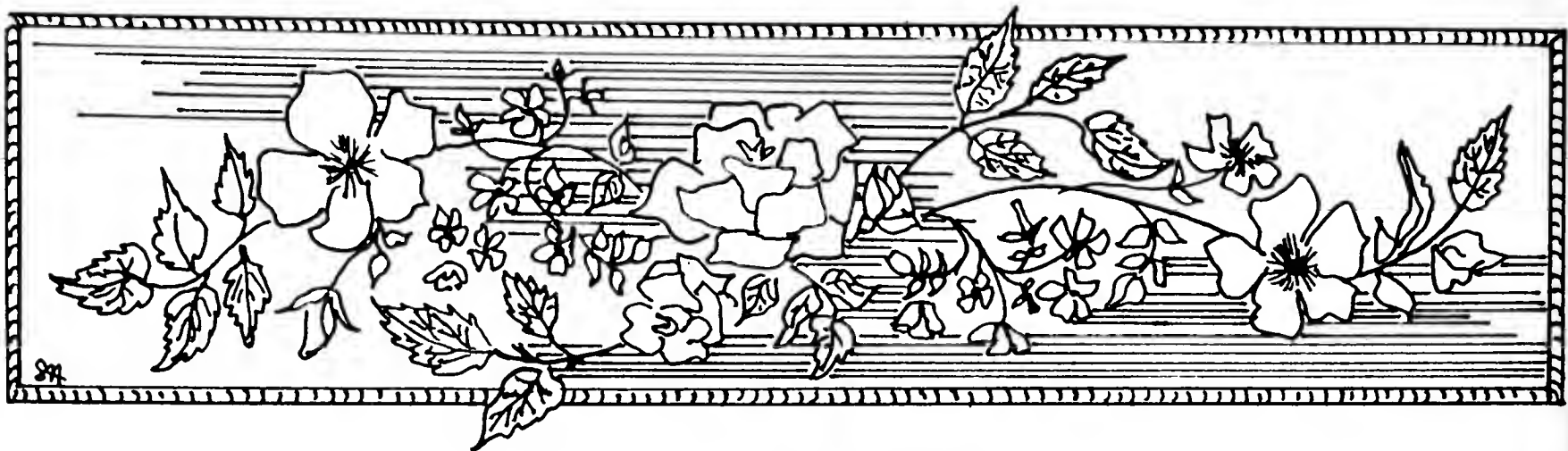
FEBRUARY 22 — Dr. Roger A. Anderson
THOSE STRANGE PLANTS CALLED LICHENS

MARCH 21 — D. H. Mitchel, M.D.
MUSHROOMS AND TOADSTOOLS, NATURE'S HOUSE CLEANERS

APRIL 25 — Dr. R. M. Kosanke
FOSSIL PLANTS — A LINK WITH THE PAST

MAY 23 — Jack Fason
THE CREATIVE PHOTOGRAPHER

These lectures will be presented in the Boettcher Memorial Conservatory, 1005 York Street at 8:00 p.m. Tickets are \$1.00 and should be purchased in advance as the seating capacity is limited.



Roses For This Area Recommended By The Denver Rose Society

Grandiflora, Montezuma



Hybrid Tea, King's Ransom



HYBRID TEAS

1. Peace
2. Crimson Glory
3. Tiffany
4. Charlotte Armstrong
5. Eclipse
6. Show Girl
7. Tropicana
8. Kings Ransom
9. Picture
10. Chrysler Imperial

FLORIBUNDAS

1. Fashion
2. Little Darling
3. Fire King
4. Vogue

GRANDIFLORAS

1. Queen Elizabeth
2. Carrousel
2. Montezuma
4. El Capitan

MINIATURES

1. Cinderella
2. Baby Goldstar
3. Pixie Rose
4. Baby Darling
5. Scarlet Gem
6. Yellow Doll
7. Red Imp

Grandiflora, El Capitan



Floribunda, Fire King



COLORADO GARDEN AND HOME SHOW

FEBRUARY 2-11, 1968

Gardens are for people to enjoy ALL AROUND THE SEASONS

Walk down your street today — any street in any town — and note how many people have gardens planned to live in and enjoy. You will find it a very small proportion, I am afraid.

Of course, all of us who read *The Green Thumb* appreciate and enjoy gardens and have them planned to use over most of the year, but we are (hopefully) 2 per cent of the community, and what are we doing to show the other 98 per cent some of the joys and benefits of gardens?

The annual Garden Show is planned to make gardening a little glamorous and attract thousands of non-gardeners in the hopes that a little of this interest will rub off on them and eventually make gardeners of them.

This spring the theme of the show is "Gardens Around the Seasons." There will be eight large gardens designed by the best gardeners and set up to demonstrate that gardens can be attractive and useful year around, here in our wonderful Colorado climate. (Some of us old confirmed gardeners may even be able to pick up a few good ideas). To the public attending this show, these gardens will demonstrate many ways to extend the interest indoors to the outdoors and use the grounds around our homes most of the year. This year in addition to the gardens there will be demonstrations of "Leisure Living in Colorado" by bringing some of the outdoor influences indoors. There will be 20 rooms decorated in the most modern manner by the American Institute of Interior Designers.

All of us old "Green Thumbers" should take this opportunity to invite all the home owners in our block (and a few other blocks) to attend this show, in the hopes that we may recruit a few of them in our campaign to make a more beautiful and livable nation, state and community.

The dates this year are February 2-11, 1968 and the place the Denver Coliseum complex.

I'll see you there
George W. Kelly

COLISEUM —

Arena: Feature Gardens, American Institute of Interior Designers Pavilion of Rooms.

Concourse: Home and Garden Displays; Competitive Flower Show.

Lower West Concourse: Garden and Home Displays.

Arcade: Vacation Home Section; Modern Home Living Arcade; Building Products; Kitchens; Home Products.

NATIONAL WESTERN BUILDINGS —

Exhibit Hall: Antique Showcase; Cartoon Theater, Special Feature Groups; Hobby Displays; Home and Garden Displays.

Stadium: Stereo Stadium — Stereo, Hi-Fi and TV Equipment.

HOURS:

Fridays, 6-10 PM; Mon., Tues., Thur., 6-10 PM

Saturdays, 2-10 PM; Wed., 2-10 PM

Sundays, 2-10 PM



Is It a Mushroom or a Toadstool?

DR. D. H. MITCHEL

THIS IS THE most common question asked by the gardener or nature-lover when first he finds one of the strange little plants known scientifically as *fungi*. It seems unbelievable to him that there are as many species of fungi as there are of the vascular plants with which he is familiar, and it is only after he becomes interested in looking for them that he starts finding them everywhere he turns—in his lawn, at the foot of his shade trees, in his compost pile, under his shrubs and in every forest glade or mossy bank he examines with care. Wherever any vegetation can grow, from arctic tundra to tropical forest and from mountain top to lowland plain, these inconspicuous, evanescent, curious little plants appear.

Since they have no chlorophyll and obtain their food by breaking down organic material rather than synthesizing it from inorganic salts and sunlight as do the green plants, fungi may be found even in dark caves or tunnels where no green plant could grow. Actually the fungus plant is killed by sun-

light and grows underground or inside wood away from the light, but it sends its fruiting bodies out into the air so that its spores may be distributed by the wind to “seed” itself in other areas. This is why the visible fleshy fruiting bodies seem to spring up mysteriously overnight and “mushroom” into abundance after a rain only to disappear in a few hours or days even though the body of the plant, or *mycelium*, may live for hundreds of years in one location.

This sudden appearance, apparently from nowhere, has led to a great deal of speculation and superstition from ancient times regarding these mysterious plants. Many of the common names for mushrooms reflect the superstitions which evolved about their occurrence. “Witches’ butter,” “dead man’s fingers,” “elf cups,” “fairy ring mushrooms,” “dryad’s saddle,” and “toadstool” are all names which date back to the days when witches’ brews of toads and bats, and midnight revels of tiny creatures on moonlit lawns and

in the depths of dark forests were commonplace. With the recent popularity of LSD, there may be a more modern association between toads, whose skins contain *bufotenine* and mushrooms which contain the hallucinogenic drug, *psilocybin*. Perhaps the long hair and unkempt garb of today's hippies have more in common with the Macbeth witches than just superficial uncleanness. So far, at least, the modern witches seem able to take their "trips" without the aid of broomsticks!

The question, "Is it a mushroom or a toadstool?" then seems to really mean, "Is it a familiar mushroom that has a common name and can be bought in cans at the store, or it is a strange mysterious 'toadstool' that may be harmful and is unfamiliar to all but witches and students of fungi called mycologists?" The mycologist would say that there is no such thing as a "toadstool" and that all the fleshy fungi should properly be called mushrooms, but I'm sure many a mycologist would like to have the easy out of being able to step on all the mushrooms he can't identify and call them "toadstools".

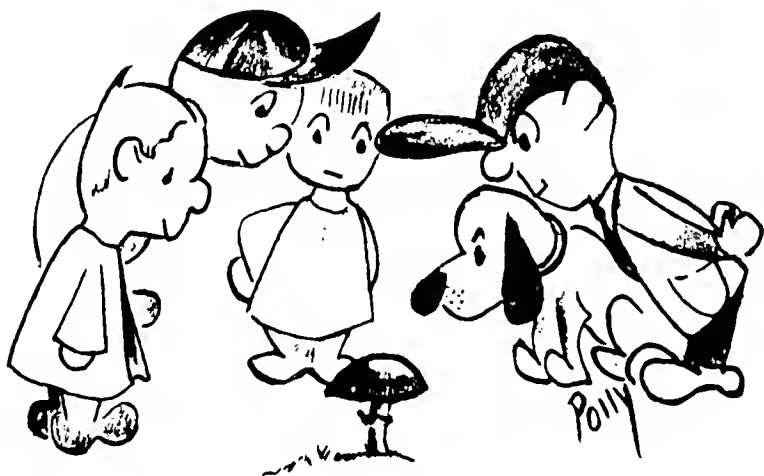
Is It Edible?

This is the next most common question of the neophyte. The answers may be: "Yes", "No", "Yes, but who wants to?" or "I don't know!" Many wild mushrooms are edible and delicious; some are deadly poisonous. Most mushrooms, like most green plants, are not particularly palatable even though they may not be poisonous. Of the thousands of species of fungi only a hundred or so have ever been tried as food because of their microscopic size, bad taste or unattractive consistency. Why the edibility of this group of plants should be of so much more interest than that of other plants is hard to understand. Very few people are concerned about the edibility of trees or

flowers or grasses, yet for some reason they immediately react to the sight of a mushroom with the question: "Is it edible?" Perhaps the only mushrooms they have seen before have been those served as food, and the association is immediate.

The ONLY way to tell an edible mushroom from a poisonous one is to learn to identify the species. Just as one can recognize a Delicious apple as being different from all other varieties of apples, and certainly different from a gourd, so he can learn to tell one mushroom from another and know which is good to eat and which is inedible or even poisonous. Most people seem to feel offended when they are told this fact and want to believe there is some easy test to distinguish "good" from "bad" mushrooms or "toadstools." They seem resentful that no one will tell them the secret or give them an easy test or simple rule of thumb to guide them in picking wild mushrooms for the table. All authorities agree that there is no such test or rule. It is not snobbishness on the part of the expert or selfishness in his wanting to keep the knowledge to himself, but simply that there is no secret — you either know the mushroom or you don't, and if you don't, for goodness sake, don't eat it. Why risk your life for 15 cents worth of vegetables!

Now one doesn't have to be an expert to collect mushrooms for food.



There are species of tasty, edible mushrooms that are so distinct in their appearance that one can readily learn to recognize them from all the others. A person can learn one or two species, and learn when and where to find them so that he can harvest many pounds of these each season without knowing any other species. Just as many people gather blueberries or chokeberries for use without any real knowledge of botany so can a person enjoy wild mushrooms safely without being a mycologist. This is the "secret" of the Europeans, Orientals and American Indians who regularly eat wild mushrooms. It is not a silver spoon or silver coin test, or parboiling and discarding the water, or adding soda or lemon to the mushrooms that protects them from poisoning, but rather the knowledge passed down from one generation to another as to how to identify and where to find one or two species that are safe and "good".

How Can One Learn About Mushrooms?

There are many good books and pamphlets to get one started collecting mushrooms safely and sanely. Through prejudice, the first one listed is *Colorado Mushrooms* by Wells and Mitchel, published by the Denver Museum of Natural History in 1966. This little, inexpensive booklet has colored pictures and brief descriptions of 70 species of the most common mushrooms found in Colorado. With this guide alone, a person could learn some 20 or 30 edible species that he could collect with safety. Don't try to learn them all at once! Learn one species at a time until you get thoroughly familiar with its variations and distinguishing characteristics. Don't guess and don't experiment! Be sure you have the exact species before you eat it!

Probably the best book for the be-



giner is just what its name implies: *The Mushroom Hunter's Field Guide* by A. H. Smith, Ph.D., America's (and perhaps the world's) leading authority on the fleshy fungi. The second (1963) edition of this book has colored pictures to supplement the detailed descriptions and black and white photographs of the first (1958) edition. For those who want a more complete and slightly more expensive field guide, I suggest *Edible and Poisonous Mushrooms of Canada* by J. Walton Groves, published by the Queens Printer, Ottawa, Ontario, in 1962. Since much of Colorado is in the Canadian zone of plant distribution this is a particularly good book to use in this region. Many other books, some European, are available. Since many species of mushrooms are world-wide in their distribution, all the following are worthwhile:

Kleijn, H., *Mushrooms and Other Fungi*, Doubleday & Co., Inc., Garden City, New York, 1962. A book for collectors of the unusual and beautiful; more a work of art than a field guide.

Lange, M., and Hora, F. B., *A Guide to Mushrooms and Toadstools*, E. P. Dutton & Co., Inc., New York, 1963. An excellent guide for amateurs and more serious students; published first in Europe.

McKenny, Margaret, *The Savory Wild Mushroom*, University of Washington Press, Seattle, Washington, 1962. An attractive field guide and cookbook with a section on poisoning.

Thomas, W. S., M.D., *Field Book of Common Mushrooms*, G. P. Putnam's Sons, New York, London, 1948. An old standby field guide.

Wakefield, E. M., *The Observer's Book of Common Fungi*, Frederick Warne & Co., New York, London, 1948. A pocket-size book with king-size information; published in Britain.

One last pitch! There is a local mushroom club with the high-sounding name of Colorado Mycological Society which meets at 7:30 p.m. the second

Monday of each month in the main room of the Botanic Gardens House. In addition to these regular monthly meetings which consist of discussions, lectures and slides to acquaint the members with various mushrooms, field trips are also scheduled on weekends during the summer months. These meetings and forays are open to the public without charge and the dues of the society are minimal. Denver Botanic Gardens has an herbarium containing about 2,000 dried specimens of mushrooms with photographs of most of these in their natural environment. Some active study of mushrooms is going on at the Gardens, and if interest is sufficient more articles about mushrooms may appear in *The Green Thumb* in the future.

EXOTICS OF COLORADO

TRAGOPOGON, SALSIFY

DR. HELEN MARSH ZEINER

COMMON WEEDS are frequently exotic plants which have been introduced into a new area by one means or another and which have found the new habitat favorable. They are also plants with an efficient means of reproducing themselves.

Tragopogon, salisfy or goatsbeard, is such a weed. Three species of *Tragopogon* can be found as weeds in Colorado; all of them are adventives from Europe. Two of the Colorado species, *Tragopogon pratensis* and *Tragopogon dubius*, are yellow-flowered. The third, *Tragopogon porrifolius*, has purple or lavender flowers.

The *Tragopogons* are members of *Compositae*, the composite or daisy family. The flower heads, occurring

singly on hollow peduncles and composed of ray flowers only, resemble those of dandelions and easily show their relationship to the composites. All have elongated, grass-like leaves with prominent veins and clasping bases where the leaves attach to the stem. They have bitter milky juice.

It is interesting to note that in the 1937 edition of Coulter and Nelson, *Manual of Rocky Mountain Botany*, *Tragopogon porrifolius* is said to occur sparingly near dwellings, and *Tragopogon pratensis* is reported in the state. Harrington's *Manual of Plants of Colorado* (1954) indicates all three species mentioned above are widely scattered throughout the state.

Tragopogon porrifolius, the purple-



flowered goatsbeard, is frequently found near fields or dwellings where it has escaped from cultivation in the vegetable garden. This plant is grown for its fleshy, edible roots, and you probably know it by the name of salsify, vegetable oyster, or oyster plant. In cultivation the white or slightly grayish roots may reach a length of one foot. They have a pleasant, rather delicate flavor which has led to the name "oyster plant". The escapes from cultivation are rather scraggly plants with thickened taproots smaller than those of their cultivated "brothers".

Purple goatsbeard and purple salsify are other common names for this species. A rather intriguing common name, "John-go-to-bed-at-noon", is sometimes used. This is really a good descriptive name, because the flowers open in the morning and close by noon.

Tragopogon pratensis and *Tragopogon dubius*, the two yellow-flowered goatsbeards, are now common weeds throughout much of Colorado. To the casual observer, they are similar in appearance. The most obvious difference between the two is in the length of

the green bracts which subtend the "flower". *Tragopogon pratensis*, meadow salsify, has dandelion-yellow flower heads which are 1 to 2 inches wide and which are borne on stems 1 to 3 feet tall. The bracts are equal to or shorter than the rays. *Tragopogon dubius*, western salsify, is usually larger than the above. Its flower heads are lemon yellow, with bracts longer than the rays.

The two species share the common names of salsify, yellow salsify, goatsbeard, yellow goatsbeard, buckbeard, and morning sun (because of their habit of opening in the morning and closing by noon).

All of the goatsbeards have an efficient means of seed dispersal which has helped them to expand their range. Like the dandelion, they produce numerous seeds with "parachutes" which can be carried long distances by the wind. When the plants have gone to seed, the old flower head is transformed into a ball or globe 2 inches or more in diameter and white or tawny in color. The funnel-shaped "parachutes" form the outer part of the seed head and are responsible for the color of the ball. Seed heads are sometimes described as blowballs.

The name goatsbeard comes from the appearance of the seed heads.

If you visited Botanic Gardens House during the holidays, you saw the seed heads of *Tragopogon* put to a unique use. The exquisite, sparkling, almost fairy-like balls of blue and gold which decorated the Christmas tree and were featured in other decorations in the house were made from seed balls of these common weeds. The person responsible for creating these delicate ornaments from such commonplace materials is one of Denver Botanic Gardens' dedicated volunteer workers, Avalonne Kosanke. We thank her for sharing her creative ability with us.

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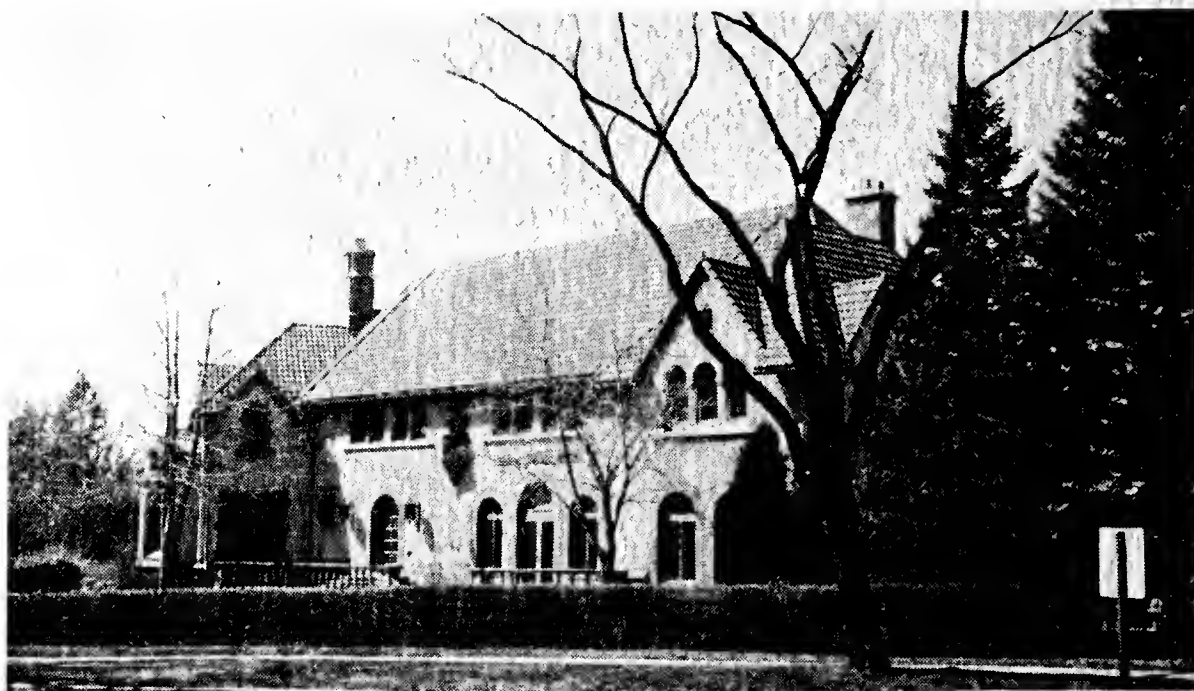
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DENVER, COLORADO

This is a non-profit organization supported by municipal and private funds.

A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

SPRING 1968



THE COVER

BUSY BEES

Photograph Courtesy Charles M. Major

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DR. HELEN M. ZEINER AND BERNICE E. PETERSEN, *Co-Editors*

SPRING 1968

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colo. 80206, or call 297-2547.

FOCUS

on

Bauhinia blakeana

in the

Boettcher Memorial Conservatory

PEG HAYWARD



Bauhinia blakeana, Hong Kong orchid tree

Bauhinia blakeana, Hong Kong orchid tree, is undoubtedly the most spectacular of the so-called “orchid trees” which are not orchids but have fragrant orchid-like flowers. The *Bauhinias* belong to *Leguminosae*, the pea family. Because this genus sets no seed, the tree was propagated originally from budwood brought from Hong Kong to a Sub-tropical Experiment Station. It has since then been propagated vegetatively by grafting and air-layering so that it is now commercially available.

The Hong Kong orchid, a small evergreen tree, grows to 20 feet high with a twisted stem and upright branches which droop at the tips. Like the other 500 species in the genus, *B. blakeana* has leaves with a broad notch rather than a pointed tip at the apex, suggesting the imprint of a cloven hoof of an animal or butterfly wings. Since the leaf appears to be twinned, Linnaeus named the

genus in honor of Jean and Gaspard Bauhin, Swiss botanists, whose work and writings in the early seventeenth century contributed much to make botany a respected science. The curious bi-lobed leaves, which more or less fold along the center rib, grow alternately along the twigs on 1-inch stalks. Prominent veins radiate from the point where the stem joins the blade.

The gray-green leaves are shed partially to display swelling blossom buds which are produced profusely even on young plants during the winter season. The rich reddish-purple flowers appear successively on long racemes for several months, each blossom lasting three or four days. These showy orchid-like flowers, 5½ to 6 inches across, have five spreading, unequal petals which are delicately veined. The fifth petal is attractively marked with a feathery design in a deeper shade of purple. Five long, upward arched stamens terminating in large anthers protrude from the center of the blossom.

Bauhinia galpini syn. *B. punctata*, red orchid, is also found in the Conservatory collection. This species, an immigrant of South Africa, may be trained as a vine. It has stunning brick-red flowers individually resembling nasturtiums.

The exciting *Bauhinias*, orchid trees, are favorite ornamentals in the warm parts of the world as well as with the Boettcher Memorial Conservatory visitors.

NOTICE TO OUR READERS

The Board of Trustees of Denver Botanic Gardens has adopted a new policy regarding The Green Thumb. Beginning with this issue, The Green Thumb will be published four times a year. By in-

creasing the pages per issue to 32 pages, the reader will receive the same total pages of information as were previously contained in six issues.

BOOK REVIEW

THE ART OF ARRANGING FLOWERS

by Shozo Sato. New York, Harry N. Abrams, 1965

One of the more recent publications dealing with Japanese flower arrangement has been added to the Helen Fowler Library. This "complete guide to Japanese Ikebana" is presented in six parts covering the history of the art, Ikebana styles, equipment, techniques and imagination, a basic course in the Moribana style, and advanced Ikebana.

Four appendixes give practical advice on flowers and gardens in relation to Ikebana and list symbolic meanings of a wide variety of plants. Profusely illustrated in black and white and in color, with working diagrams, this book is, in addition, a beautiful piece of book-making.

L. M. Crissey, *Librarian*

LOOK, WE'RE GROWING



WE ARE GRATEFUL for the opportunity to thank the many friends of Denver Botanic Gardens who have helped their gift shop grow. The combined efforts of many people — Associates, members and visitors — have raised the shop from a seedling to a mature plant.

Our container has become inadequate and we are happy to announce the shop will be transplanted to the east section of the Conservatory south room. The additional space will enable the shop to increase the selection of gift items, books and educational material.

We are proud to have added W. H. Brockmann's ceramics, another of our exclusive lines in the Denver area. Many of his ceramic frogs, rabbits, birds, and forest animals have been given happy homes by delighted customers. Mushrooms of all kinds, flowers, butterflies and even lowly caterpillars have been captured in his unique style.

The long awaited Denver Botanic Gardens slides have arrived and surpass our expectations. They are in two sleeves of five slides each. Ten different views are available.

In response to the many inquiries, we now carry wild flower seeds — columbine, of course, and many other varieties. Complete instructions are printed on each packet.

Do visit us at our new location in the south room and help us celebrate our opening. The date is May 10, the first day of the Annual Plant Sale. We will have many new gift items for you.

Cathy Petersen, *Chairman*
Gift Shop Committee

IKEBANA INTERNATIONAL

ALICE WILLIS

IKEBANA, THE JAPANESE art of flower arrangement, is international in scope, expresses a universal appreciation of flowers, and establishes a link between man and nature. The term "Ikebana" may be translated freely as "fresh flowers," or "an orderly arrangement of flowers according to certain rules."

It is believed that this art had its beginning in simple floral arrangements placed before Buddhist images in India. It later made its way to China. In the latter part of the sixth century, Japanese envoys, on a cultural guidance mission to China, returned home with this art which eventually was to find a place among the cultural activities of Japan.

In the second half of the nineteenth century, a blending of Occidental and Oriental cultures resulted in the impact of Ikebana on the Western world since the West had nothing similar to this art. During this interchange, Western flowers were introduced into Japan which provided greater variety of plants and flowers for Ikebana.

From the first extremely simple arrangement, usually a single flower on a stem with a few leaves, Ikebana composition has progressed through the centuries to intricately constructed masterpieces involving much time, study, contemplation, and a large assortment of accessories. It has become a specialized type of art work requiring tools and containers adapted for the purpose, and expert knowledge in selecting, preparing, and handling both fresh and dried materials.

Certain basic principles of construction are required in this art, and if these are mastered and followed the flower arranger may exercise creative ability freely and remain within the established limits. Mood, season, and occasion are expressed by choice of materials and their placement in the creation. One steadfast principle is the Oriental respect for each individual part: stem, leaf, and flower.

Many styles have evolved from the numerous flower arranging schools that have emerged. Eleven styles are cited in a recent publication concerning this art. These range from simple, naturalistic designs to more ornate compositions, and vary in size from small decorative pieces to arrangements more than six feet tall. Each style follows an established arrangement form.

As with any other art, the skill of the flower arranger is the most important ingredient in the finished product. A period of apprenticeship might extend for years before the student is considered capable of the ultimate expression in a finished composition. Manipulating the materials for effect, determining the proper angle and direction of slant from the vertical, and positioning the various items in respect to each other are of special significance to the finished work.

Modern industrial developments allow for a wide choice of tools, containers, and manufactured materials. Dyes, lacquers, paints, and florist's wire



In preparation for coming exhibit of Ikebana arrangements, Mrs. Frank McLister, left, and Mrs. James J. Waring, trustees of Denver Botanic Gardens and members of the Denver chapter of Ikebana International, visit the Conservatory. The exhibit will be held April 27 and 28, 1968, in the south room of the Conservatory and will benefit Denver Botanic Gardens.

are used to good advantage in contemporary flower arranging. The character of materials is changed by bleaching, tinting, bending, pruning, drying, and otherwise changing the natural emphasis of materials for effect in the final design.

Today's masters of prominent schools of Ikebana look with approval on bold, striking contrasts, a departure from the ancient ideal of serene beauty. Originality in choice of accessory selection, such as rocks, driftwood or dead wood, and twisted or deformed botanical subjects is encouraged.

The container is considered an important part of the arrangement, and one of the joys of an Ikebana designer is collecting a supply of suitable vases.

These range from the flat shallow bowl to larger, taller and often more striking forms. The ideal collection might include containers made of bronze, wood, ceramics, basketry and glass of varying attractive shapes. It appears that bronze vessels were more generally used at the time of the origin of Ikebana.

The Denver Chapter of Ikebana International was founded in 1962 and is one of 140 such clubs throughout the world. The local chapter consists of 42 members, and membership is open to anyone wishing to join. The purpose of Ikebana International, whose theme is "Friendship through Flowers," is to pursue and further the art of Japanese flower arranging and related Japanese arts, such as silk-screening, painting, bonsai, and tea ceremony.

The local chapter holds monthly meetings in Botanic Gardens House. An annual exhibit of Ikebana arrangements by its members is held in Boettcher Memorial Conservatory. Proceeds from the April 27th and 28th, 1968 show will be used to benefit Botanic Gardens House.

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EXOTICS OF COLORADO

Chaenomeles — Flowering Quince

DR. HELEN MARSH ZEINER

WITH THE FIRST warm days of spring, flowering quince bursts into a brilliant display of scarlet or pink flowers. This familiar and much-loved shrub has been a favorite for many years because it is such a delight after a long, drab winter.

Probably the most frequently seen flowering quince is *Chaenomeles lagenaria*. This shrub has several common names: flowering quince, Japan quince, Japanese quince, Japanese flowering quince, japonica, and firebush. Long ago in England country folk called this showy shrub "fairies'-fire".

From the common names Japanese flowering quince, Japanese quince, Japan quince, and japonica, one might assume that the plant is a native of Japan. Indeed, it was brought from Japan to England, but it is actually a native of China that has been long cultivated in Japan. *Chaenomeles lagenaria* was introduced to the Kew gardens in 1796 by Sir Joseph Banks, and soon became a popular shrub in England. It came to America from England, rather than from China or Japan.

The original plants bore scarlet-red flowers, but numerous horticultural varieties have been developed over the years and now the plant is available with flowers in many shades ranging from scarlet-red through pink to white. Double or semi-double flowers have also been developed. The flowers appear before the leaves open and are usually borne on the lower parts of the branches. They hug the branches tightly, making them appear to be clothed in showy bloom.

Chaenomeles lagenaria is a shrub 4 to 6 feet tall, upright or spreading in habit of growth, with spiny, glabrous (smooth) branches. The leaves are dark green and shiny, making the shrub attractive even when it is not in bloom.

Fruit, when formed, is greenish-yellow and reminds one of a somewhat deformed pear. It is very fragrant. These fruits are sometimes used for jelly, but they are inferior to the fruits of the common quince, *Cydonia oblonga*, a small tree grown expressly for its fruit. The fruits of flowering quince retain their fragrance even when dry, and are occasionally used to impart a pleasant scent to

clothes closets. They can be used to make small pomander balls, but they are very hard and difficult to pierce for studding with cloves.

Since flowering quince blooms so early in the spring, it is an excellent shrub for forcing. Branches may be taken any time after Christmas and will soon give you a preview of spring right in your living room.

This shrub is sometimes recommended for use in hedges, but it is more often seen as a specimen shrub. It is reported that flowering quince is often espaliered in England, especially on warm south walls. This idea would be worth trying.

Chaenomeles japonica, sometimes known as lesser flowering quince, is a low-growing shrub reaching a height of about 3 feet. It has brick-red flowers by nature, but horticultural varieties in rose and white have been developed. Fruits, which can be used satisfactorily for jelly, are produced freely.

Chaenomeles japonica is a native of Japan. It was introduced to England about 1860, and was brought to America from England.

Chaenomeles lagenaria and *C. japonica* have been crossed to produce a hybrid called *C. superba*. It has large flowers of a deep blood-red color.

Chaenomeles sinensis, Chinese quince, is an old favorite in Southern gardens. It has pink flowers which appear after the leaves are formed. This shrub is the least hardy of the three species and also the least well-known. It has, however, an interesting history. A native of China, it was introduced to England about 1800. Then, perhaps because it is not very hardy, it became completely lost to cultivation in the British Isles. It was re-introduced to England from Italy in 1898, and then was brought to America, where it has proven satisfactory in the southern states. *Chaenomeles sinensis* is not recommended for the Rocky Mountain States or for the northern states in general.



PLANT SALE

MAY 10 and 11, 1968

9:30 a.m. — 5:30 p.m.

Let's Grow Together

So You Want To Eat Wild Mushrooms!

DR. D. H. MITCHEL

WHEN THE SPRING RAINS and summer sun start you on another season of gardening and camping trips, don't ignore the mushrooms you've carelessly spaded under or stepped on. Collect them; study them; and when you've learned to tell the safe, edible ones from the poisonous or tasteless ones, take them home to add variety and flavor to your meals. Don't make the mistake of eating them first and trying to identify them later! The hospital is a poor place to study, and some deathbed statements tell us that the deadly poisonous ones may taste as good as any.

The first thing to remember is that mushrooms as well as any other food can spoil and become infected with bacteria that can make you sick. Many cases of "mushroom poisoning" are simply cases of "food poisoning." If one is not familiar with the appearance of a fresh healthy mushroom, he may mistakenly eat a spoiled or infected specimen when he wouldn't think of eating a rotten apple. Don't forget, either, that some people are allergic to mushrooms just as some people are allergic to strawberries or tomatoes. Never eat a large quantity of any mushroom you've never tried before, even though the books say it's safe. You may be the one person who is allergic to it, or you may find it disagrees with you even though other people can eat it freely. Until you're sure of the species you can eat safely, don't mix mushrooms you have collected. One stranger may ruin what would otherwise be a tasty dish; one poisonous one could be fatal!

The ONLY way to tell a mushroom that is good to eat from one that is inedible or even poisonous is to know the species. There are, however, some general rules that can guide one to safe eating even without learning the scientific names of the species that are good. One should first learn the different shapes of mushrooms since many of them look much different from the umbrella-like cap and stalk that has led to the name "toadstool." Since the most dangerous mushrooms are of this "toadstool" shape, it is often easier for the beginner to learn the edible mushrooms that don't look like mushrooms. A few of these are described below with figures to give some idea of their form and appearance.

Most mushrooms start out as a little round ball or "button" just below the surface of the ground but later expand into their typical adult shape. Some mushrooms called "puffballs" remain as round white balls no matter how large they grow — sometimes up to 3 feet in diameter. All puffballs are said to be good to eat but as is so often true in nature there are a few catches! First, be sure the ball you find is a puffball and not the button stage of another mushroom. The button stage of the deadly *Amanita verna* is white and round just like a small puffball. ALWAYS slice a puffball before tossing it into the skillet. The flesh of a puffball should be white and uniform all the way through (just like a marshmallow), but the button stage of other mushrooms will show some structure of the developing gills and veils. (See Figure 1.) The second catch is that there are

“earthballs,” “crampballs,” and other inedible ball-shaped mushrooms besides the puffballs. These are darker in color, usually grow underground or almost completely buried in the soil or forest litter, and in general have thicker, tougher skins and darker, hard or gritty flesh. Thirdly, as puffballs mature, the white flesh turns first yellow, then brown, and finally becomes a black liquid mass of spores. Again, be sure to slice all puffballs to be sure they are puffballs and that they have not turned dark, since all but pure white flesh is rancid and tastes unpleasant.

Mushrooms of the clavaria group (Figure 2) grow up as stalks or clubs, either singly or branched like coral or cauliflower. So far as is known, all the “coral” mushrooms found in Colorado are edible, but some are woody and some have a fishy taste that makes them unattractive to most people. One of the most common species is *Clavicornia pixidata*, a flesh-colored, intricately branched species that has six to ten tiny tips at the end of each branch resembling the front foot of a toad or a tiny crown of spikes. This species usually grows on dead aspen logs or at the foot of dead aspen trees. *Ramaria aurea*, which grows on the ground under Colorado blue spruce, is named “aurea” for its golden-yellow color. It is good to eat and can be found in abundance in early August throughout the Rockies. Be careful to clean the spruce needles and insects out from between the branches before cooking. *Clavaria formosa*, a poisonous clavaria resembling *Ramaria aurea* in its rich, yellow color, has a pinkish tinge to the branches. It has not been reported from Colorado, but the possibility exists that it might grow here. Never eat a clavaria whose stems have a red or pink color.

The mushroom called *Morchella esculenta* or “morel,” most highly prized for its flavor, is also quite unique and barely resembles the common mushroom. Its pitted brown head on a hollow white stem is distinctive and with any care can be readily identified. Nature always seems to deal a joker in each hand, however, and there are some poisonous helvellas that superficially resemble the delicious morels. (Figure 3) Careful observation will show that the helvellas have folds or ridges with valleys in between. These ridges reminded someone of

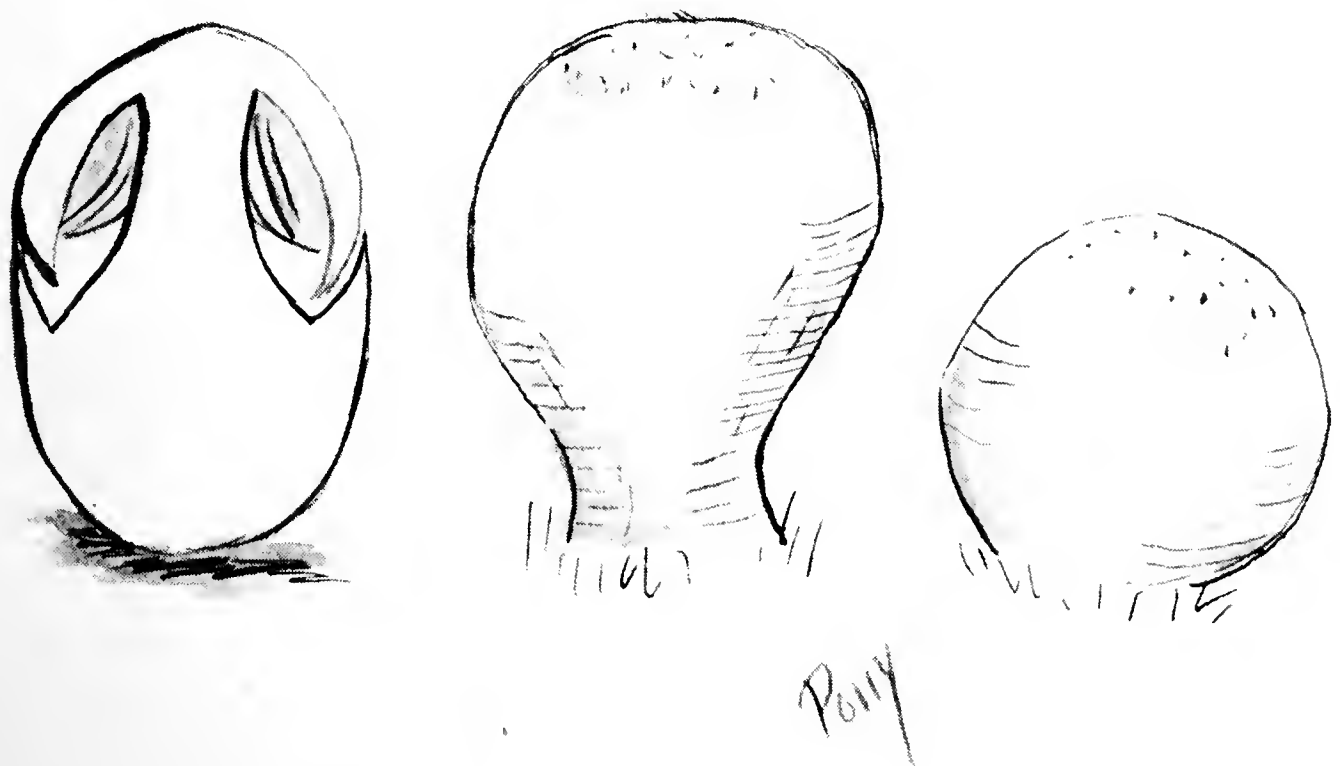


Figure 1

the ridges or “gyra” of the brain and now this group of helvellas is often called *Gyromitra*. Some people eat them with relish but others become violently ill. Chemists have extracted a poison called “helvellic acid” from these mushrooms. This poison causes destruction (hemolysis) of red blood cells and endangers the life of the person who eats them. Just remember that the tasty morels are pitted with sharp ridges between the pits while the helvellas or “false morels” have rounded folds with long narrow valleys in between.

When one starts looking at mushrooms closely, he will find that some have gills or leaf-like parallel plates on the under surface of the cap running outward from the stem to the edge of the cap, while others have pores or tubes hanging downward from the cap. (Figure 4) The mushrooms with pores are called “boletes,” and nearly all of them that are found in Colorado are edible. Some species with red or pink pores are poisonous and one species with a yellow pore-surface that turns blue with bruising can also make one sick. If all red-pored species and this yellow-pored *Boletus miniato-aleovacious*, whose pore-surface turns blue when bruised, are avoided, a person can be safe when eating boletes. This doesn't mean that all other boletes are particularly good. Some are bitter, and some are acrid and pucker the lips like alum does. In many species the pores become slimy upon cooking and ruin the consistency of the mushrooms. Most people prefer to peel the pores from the underside of the cap and discard them before cooking the boletes.

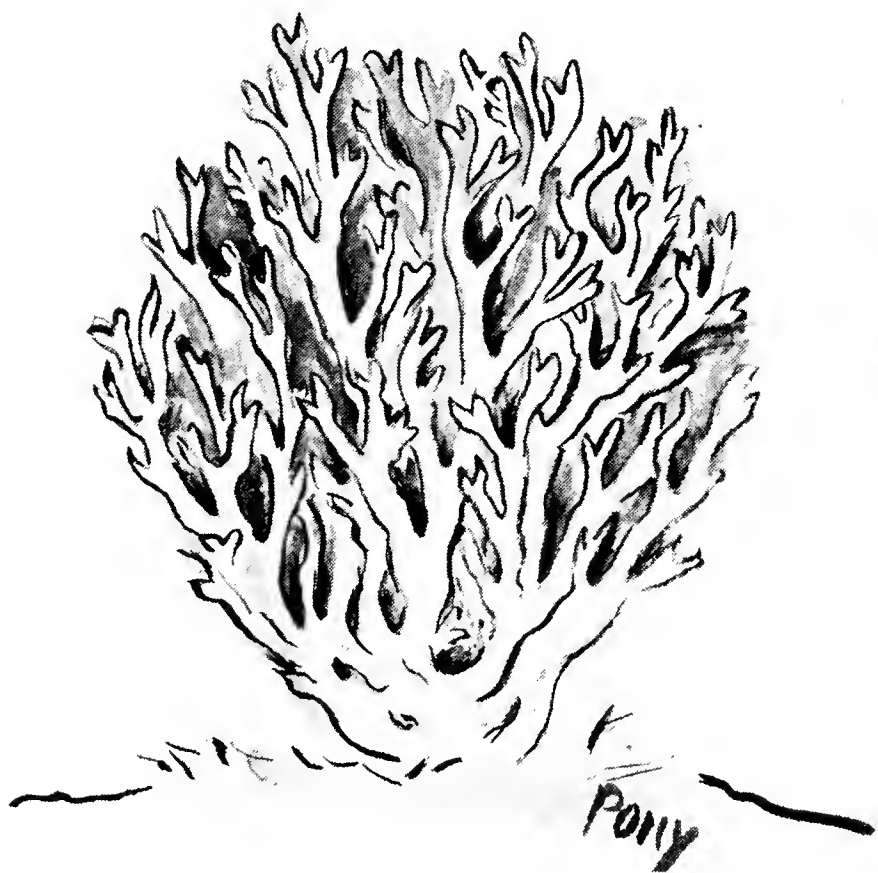


Figure 2



Figure 3

While you're collecting for the table, don't forget to enjoy the beauty and oddity of mushrooms — especially the tiny colorful ones that are too small to eat. Just as one can miss the beauty and novelty of wild flowers until he stops to examine the small delicate ones hidden in the grass, so one can miss exquisitely beautiful mushrooms hidden in the litter of the forest. A 10-power jeweler's glass will add to the appreciation of the intricate shape and delicate coloring of these curious little plants. In the words of the slogan recently adopted by the North

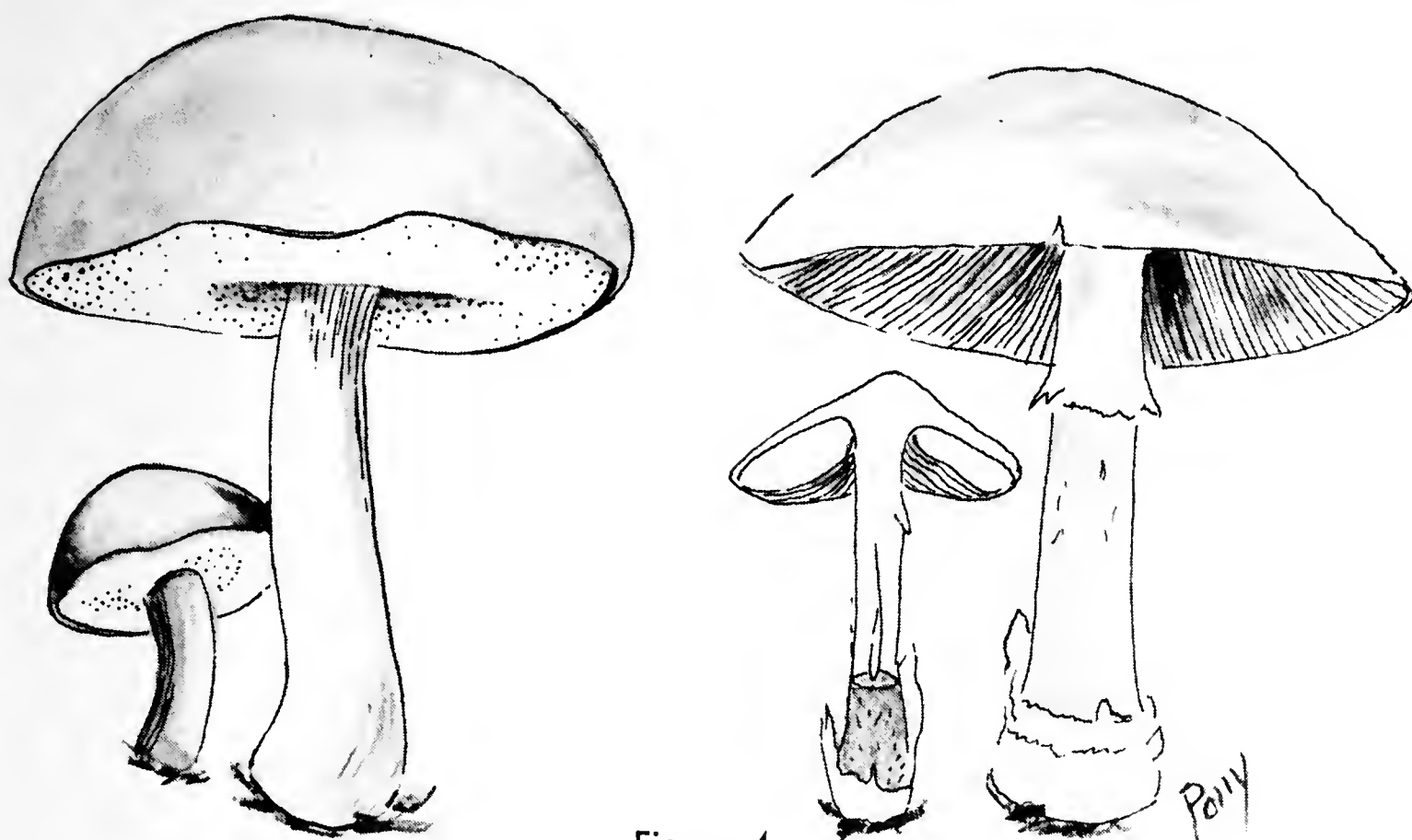


Figure 4

American Mycological Association: DISCOVER MUSHROOMS — A WORLD OF WONDER AT YOUR FEET!

Last warning — BE CAREFUL! It takes a little time to learn to recognize the distinguishing characteristics of edible and poisonous mushrooms. Even though the “oddball” mushrooms described above are so distinctive that recognition is easy, mistakes can be made. Get a good book or field guide and learn more about these characteristics. (A list of books was given in the last issue of The Green Thumb.) If a mushroom you find doesn’t quite fit a description, don’t take a chance. Don’t risk your health or life for a serving of vegetables! Good hunting!

DENVER BOTANIC GARDENS
909 York Street, Denver, Colorado 80206

I hereby apply for membership in the Denver Botanic Gardens ☐

I wish my membership in the Denver Botanic Gardens extended ☐

Enclosed is \$_____ for my annual dues.

Class of Membership desired: (check one)

- | | | | |
|--|----------------|---------------------------------------|---------------|
| <input type="checkbox"/> Regular | \$ 5.00 | <input type="checkbox"/> Supporting | \$25.00 |
| <input type="checkbox"/> Participating | \$10.00 | <input type="checkbox"/> Contributing | \$50.00 |
| <input type="checkbox"/> Sustaining | \$100.00 | | |

Name_____

Address_____

City

State

Zip Code

Denver Botanic Gardens Lecture Series

APRIL 25 — Dr. R. M. Kosanke

FOSSIL PLANTS — A LINK WITH THE PAST

MAY 23 — Jack Fason

THE CREATIVE PHOTOGRAPHER

These lectures will be presented in the Boettcher Memorial Conservatory, 1005 York Street at 8:00 p.m. Tickets are \$1.00 and should be purchased in advance as the seating capacity is limited.

Insecticides Injurious to Plants

In studies of pest controls, experts have found that some chemicals are damaging to growth of certain plants. Following is a list of known sensitivities of plants grown here:

DDT: privet, English and Chinese elm, hackberry, goldenrain tree, mountain ash, Bechtel crabapple, barberry, fragrant viburnum, tulip, crocus, delphinium, bleeding heart, ferns. Use of DDT also results in sprayed plants' becoming susceptible to mite population buildup.

DORMANT OIL: black walnut, mountain ash, maples, Russian olive, all evergreens.

LIME-SULFUR: Pinyon pine, *Juniperus communis saxatalis* (low native juniper), white fir, Black Hills spruce, *Viburnum lantana* (wayfaring tree). This product, used as dormant spray, can stain painted surfaces and some types of stone.

MALATHION: Canaert juniper, Boston fern, maidenhair fern, African violet.

SULFUR: viburnum, tomato, pinyon pine.

KELTHANE: Bechtel crabapple, *Prunus tomentosa* (Nanking cherry), maples, *Viburnum opulus* (European cranberry), Boston ivy and woodbine or Virginia creeper.

SPRAY SCHEDULE

On pages 50 and 51 is a list of more common insects attacking trees, shrubs, and evergreens in the Denver area.

This spray schedule is intended as a guide for the home gardener. Area experts were consulted, and the following is a summary of their responses. Spray only if necessary. Spray on a calm day, wear mask if directions indicate or many plants are to be treated. Read and follow labels carefully. Keep all pesticides out of reach of children.

DENVER BOTANIC GARDENS

annual plant sale!

MAY 10 - 11

9:30 - 5:30

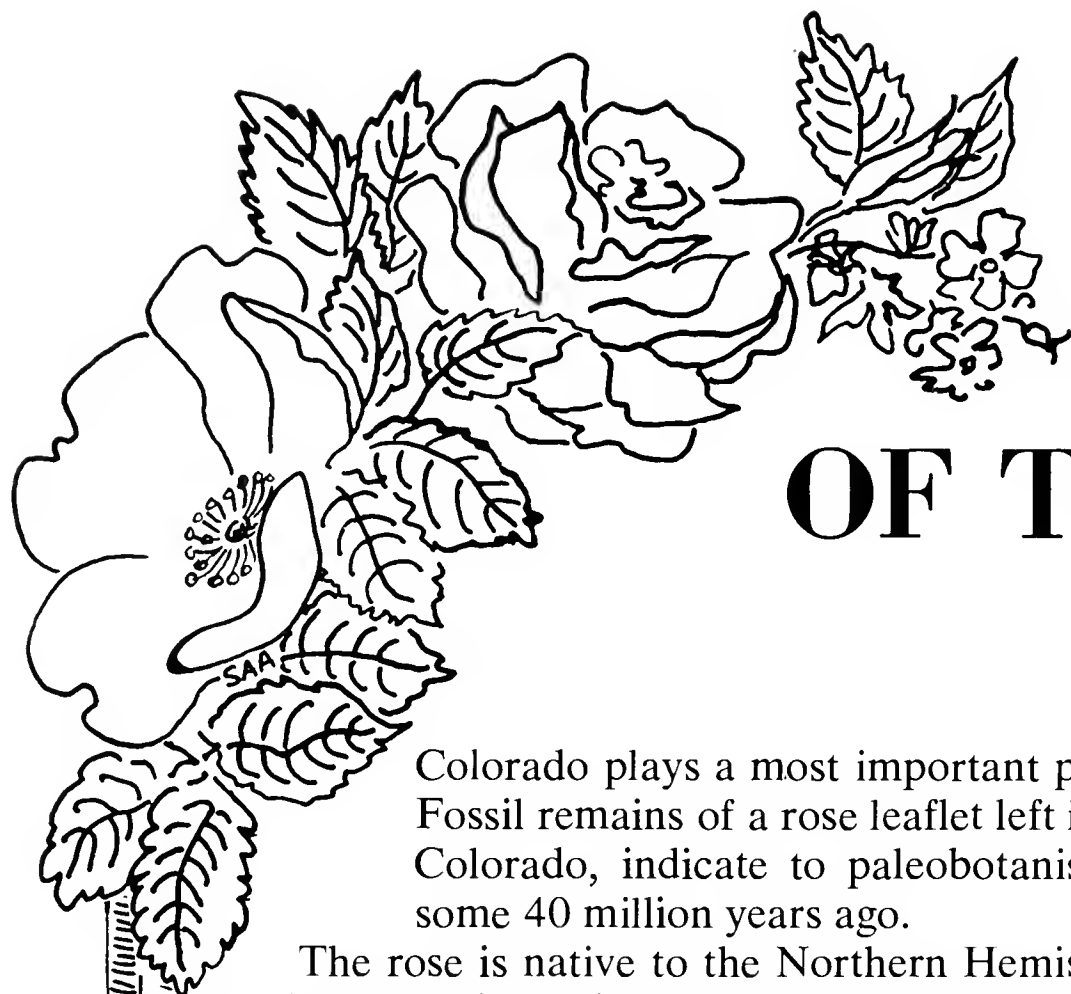
TREES • SHRUBS • HERBS • CACTI • ROCK GARDEN PLANTS • PERENNIALS • ANNUALS • CHILDREN'S CORNER



		↔	↔	L	Lilacs	Leaves	Lindane or Malathion and DDT
	↔	↔	↔	E-A	General	all over	Malathion-Tedion (omit canaert cedar)
	↔	↔	↔	A-L	Lilac	Trunk canes	DDT or Lindane
	↔	↔	↔	Cl.	Elms	Branches & twigs	Sevin & Malathion
	↔	↔	↔	Cl.	Elms Maples Hawthorn	Branches & Twigs	Sevin & Malathion
	↔	↔	↔	Cl.	Lilac-ash cotoneaster cottonwood Maple	Twigs & Branches	Malathion and DDT
	↔	↔	↔	A	Privet	Leaves	Malathion
	↔	↔	↔	A	General	Leaves & twigs	Isotox
	↔	↔	↔	L	Mahonia	Leaves	Metasistox R Granular
	↔	↔	↔	A	Pinyon Pine	Needles	Isotox (Good Luck)
	↔	↔	↔	A E	Pinyon	Trunk & branches	Dieldrin (Good Luck)
	↔	↔	↔	L	Plum cherry Hawthorn	Leaves	Malathion or Isotox
	↔	↔	↔		Roses	Leaves	Karathane
	↔	↔	↔	L	Spruce White Fir	Needles	Malathion and DDT
	↔	↔	↔	A	Pines	Trunk & twigs	Isotox and Malathion
	↔	↔	↔	A	Apples	Trunk & branches	Isotox

*Trade names mentioned are intended for information, and endorsement is not implied.

L - Larva
A - Adult
E - Egg
N - Nymph
Cl - Crawler



HISTORY OF THE ROSE

JOAN G. FRANSON

Colorado plays a most important part in the history of the Rose. Fossil remains of a rose leaflet left in a slate deposit at Florissant, Colorado, indicate to paleobotanists that the rose existed here some 40 million years ago.

The rose is native to the Northern Hemisphere. Today the rose grows nearly everywhere, but no native wild variety has ever been developed south of the equator. Roses probably originated in Northeast Asia and even today a tremendous number of wild rose forms exist in China and Siberia.

Perhaps the earliest reference to cultivation of roses dates back to the Chin-Nung reign in China, 2737-2697 B.C. During the Han dynasties, 206 B.C. to 9 A.D., rose culture in China reached its peak and ornamental gardens became so large and numerous as to pose a threat to food production.

During the early 1900's on the Island of Crete, wall paintings were discovered in the ruins of the Palace of Knossos. These frescoes showed plants grown in the period of 2000 B.C. One striking picture is of a stylized yellow Gallica type rose.

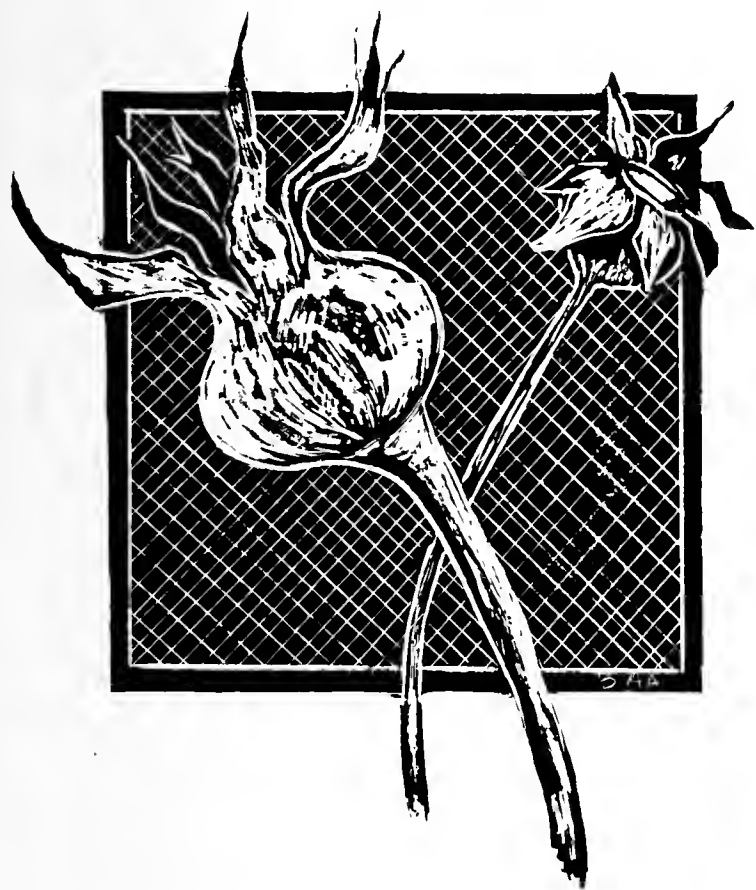
One of the Seven Wonders of the World, the Hanging Gardens of Babylon, contained 30,000 roses. During the sixth century B.C. these famous gardens were the inspiration for the Greek poetess Sappho to pen the famous phrase for the first time — the Rose, Queen of Flowers.

Before 300 B.C., Theophrastus, one of the fathers of botany, described roses having from 5 to 100 petals and ranging in color from pink to white. The many-petaled rose may have been the Damask or perhaps the Centifolia.

The Romans brought rose culture into prominence. They made roses bloom in winter by building hot houses where water was circulated through earthenware pipes. The Roman poet Virgil was the first to describe the twice-blooming quality of roses in about 50 B.C. Romans used roses for decoration at feasts and also in other ways. Pliny (23 - 27 A.D.) in his *Natural History* discusses 12 roses and mentions 32 remedies obtained from them — such as hips of roses used to prevent scurvy. It is known today that rose hips are exceedingly high in vitamin C.

After the fall of the Roman Empire and during the Dark Ages and

Middle Ages, rose culture retreated to the monasteries. At first leaders of Christianity shunned the rose because of its former association with Romans and depravity, but eventually this opposition to the rose was overcome and the rose became the emblem of Christianity. In fact rosaries were made from the fruit or dried seed pods (hips) of the rose.



Rose Hips

The revival of the rose really began during the reign of Napoleon and Josephine. The famous garden of Empress Josephine was begun in 1804 at her Chateau at Malmaison near Paris. By 1814 the garden contained all the known species and varieties. There were 167 Gallicas, 27 Centifolias, 3 Mosses, 9 Damasks, 22 Chinas, 4 Spinosissimos, 8 Albas, 3 Foetidoes, 1 Musk and 13 species, 257 in all. The British held Empress Josephine in such esteem that even during the war when they captured a French ship carrying seeds and plants addressed to her, they immediately forwarded them to her. Following her death in 1814 the garden

deteriorated and was completely destroyed during the Franco-Prussian War. When attempts were made to restore it in 1910, 196 of the original 257 varieties were found.

The Gallica rose is considered the first recognized rose species. It is an extremely hardy rose — the “Adam” of roses related to the Western Hemisphere. Gallicas were garden roses thousands of years before Christ. Until 1600 there were few varieties of Gallicas but after that the Dutch began to raise seedlings. By 1800, catalogs listed thousands, most of which were too much alike (a complaint heard today about some of our modern rose varieties).

From the Gallicas came the Damask, another truly ancient rose. As far as fragrance is concerned, the Damasks are the ancestors of our modern roses. These are the twice-blooming roses of Virgil.

The Alba rose probably appeared in the thirteenth century. This may be the fragrant White Rose of England in the War of the Roses. The Albas and their hybrids range in color from white to blush to palest cake-frosting pink with distinctive grey-green foliage.

The famous “cabbage rose” label belongs to the Centifolia rose and refers to its shape, not size. This is the “rose of a hundred petals” and is the one most people mean when they want to see a cabbage rose. It was produced after a century of hard work by the Dutch hybridizers about 1700 and came from a cross of Damasks and Albas. This, too, is the favorite rose of Dutch painters, and some of their paintings are so exact that we can recognize roses we have today.

The greatest contribution the Centifolias made was to “sport” the bud variation which became the beloved Moss rose. Moss roses are more than

just flowers — they are roses of magic. The Moss rose resembles the Centifolias EXCEPT all along the sepals is a frilly green growth that folds back like a lacy fern as the bud opens into



Moss Rose

bloom. Some varieties are mossier than others. To watch a bud of Crested Moss opening into bloom size is truly rose magic.

As close as can be discovered, the China rose and the Tea rose began in ancient Southwestern China. These are quite different types than those discussed above. They live in a warm climate and bloom 12 months a year. Their foliage is not as subject to fungus ills but the plants often suffer winter damage. There were four major types of roses in China: the Red China, the Pink China, the Pink Tea and the Yellow Tea.

The Red China when crossed with the Gallica rose and the Damask rose produced the Portland rose which was the first good garden hybrid. The Portland rose is one of the primary ancestors of our modern roses. Also

this history of the Red China rose is quite important today. The Red China itself was nothing great — small, semi-double and sometimes streaked with white. This tendency to streak white or have an occasional white petal is apparent in its red Hybrid Tea descendants. Who has not seen a white streak or petal in an occasional bloom of Crimson Glory, Mirandy or Chrysler Imperial? Roses closely related to the Red China also show a tendency to deepen in color as the flower ages.

The Pink China was hybridized by the French and produced the Bourbon rose, which is named for the Isle of Bourbon in the Indian Ocean.

Tea roses get their name because the fragrance of the blossoms is similar to that of fresh tea leaves when crushed (not dried leaves or the beverage). The Pink Tea and the Yellow Tea became the forerunners of our modern Roses. In 1837 when crossed with Portland roses and Bourbon roses, the first true Hybrid Perpetuals appeared. About 1900 the Hybrid Perpetuals came to the end of their popularity.

Hybrid Perpetuals crossed again with China Tea roses produced the Hybrid Teas. In 1867, just one hundred years ago, La France was produced and is generally recognized as the first of the Hybrid Teas. Most early Hybrid Teas were pink. In 1900, Liberty, the first truly red Hybrid Tea, was introduced. Joseph Pernet worked for 20 years before producing a stable, non-fading, deep yellow Hybrid Tea. He brought out Soleil d'Or in 1900. Today it is estimated that 75% of our Hybrid Teas are related to Soleil d'Or. This rose black spots easily, but much of this has been bred out of its hybrids. It was the founder of all our yellows, flame-scarlets, oranges, apricots and coppers.

Small-flowered Polyanthas were

probably the result of a cross between a Multiflora and a China rose. When these Polyanthas were crossed again with Hybrid Teas, the Floribunda class was created.

With her now famous line, Gertrude Stein may have been correct in one way, "a rose is a rose is a rose," because in nearly all languages when a reference is made to the plant "rose" its name is

the same as the color. And with but a slight variation in spelling it is recognizable — rose — rosa — ros — roos — ruze — rooza — roja — rosen — rhoden. To anyone who has grown the magic of a rose, there is a spell cast that can only be eased by growing another rose.

Ed. Note — Mrs. Franson is a member of the Denver Rose Society.

Check List For Rocky Mountain Rose Care

HERB FRANSON

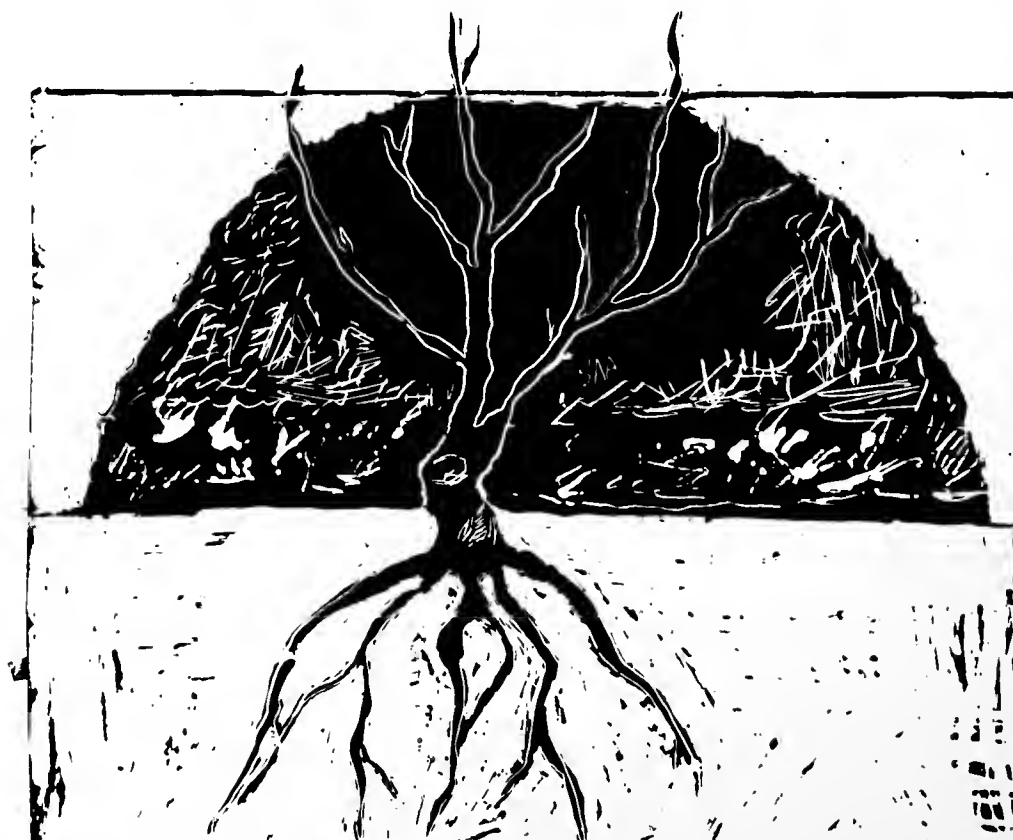
Preparing Rose Beds

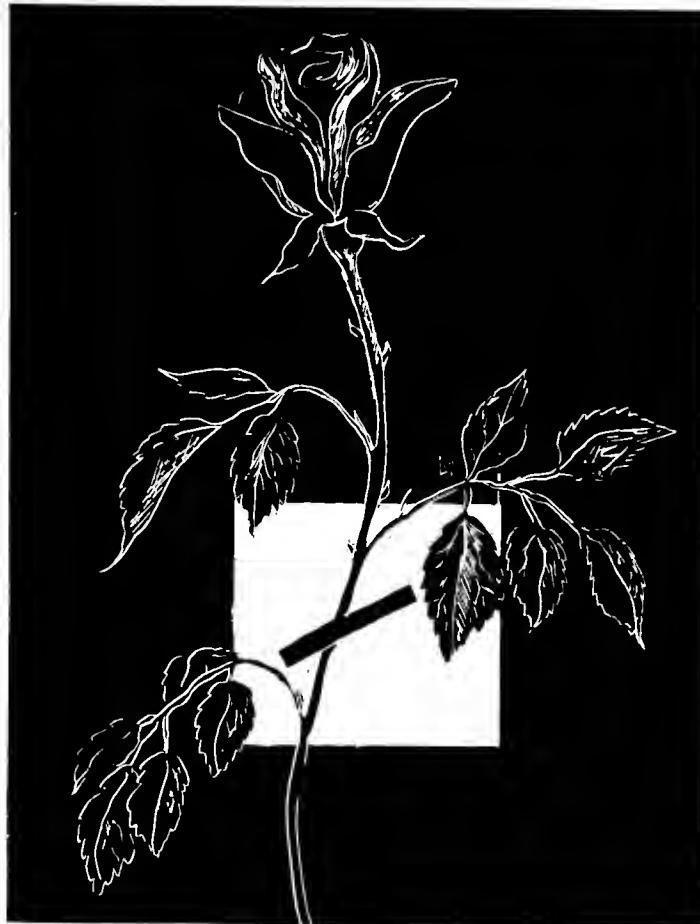
1. Rose beds should get at least 6 hours of sun. Morning sun is best.
2. Locate the beds away from tree roots if at all possible. Sometimes the tree roots toward the rose bed can be cut out without damage to trees.
3. Remember front yards (as well as backyards) can have rose beds.
4. Dig beds 18 to 24 inches deep, preferably in the fall so soil has a chance to settle before planting time (usually spring in Rocky Mountain area).
5. Mix in manure, peat, or any good humus material. Put superphosphate near the bottom of the hole to promote root growth.
6. Use the top soil around the root area and subsoil on top. You can improve the top area but can do little with the soil around roots once the rose is planted.
7. Check pH factor. 6.0 to 6.5 (no lower than 5.5). Use sulfur to lower pH.
8. If planting individual roses, dig hole 18 inches deep and 18 inches across. Make sure bottom of hole is as large as top; that is, not rounded, so roots will have room to grow.
9. Let soil settle. Keep bed 1 to 3 inches below level of surrounding ground. This makes for easier watering and allows room for mulch.
10. If March delivery is expected, dig hole ahead of time so that soil can be worked in bad weather. Removed soil can be covered with plastic to keep it dry. Never work wet soil.
11. Dig holes at least 24 inches apart for Hybrid Teas, Grandifloras and Floribundas, allowing more space for Climbers. This promotes good circulation of air.

Planting Roses in Spring

1. Get No. 1 grade plants from a reputable local nursery. A No. 1 grade rose calls for three or more canes 18 inches long, the *three or more* canes being the important factor as canes are sometimes cut back for shipping.
2. Bare-root planting time in the Rocky Mountain area is from March 15 to April 15. Established roses may be transplanted with success if done at this time before dormancy is broken.
3. Whether ordered from local nursery or by mail, plants should be placed

- in water 12 to 24 hours before planting to increase their water content.
4. If weather is bad when roses are received, dig trench and bury plants until ready to plant.
 5. Prune plants to 10 to 12 inches. Check roots and cut off broken ones. Cut spindly canes back to bud union.
 6. Snip off the ends of all roots to stimulate growth of fibrous roots.
 7. Take three or four plants at a time in a container of water to prepared holes in rose bed. **DO NOT LET ROOTS DRY OUT BEFORE PLANTING.**
 8. Set bud union about 1 inch above ground level. Use a stick to measure ground level. This improves chance of basal breaks. If the bud union remains above ground, it will require some winter protection. If bud union is set slightly below ground level, there is less need to mound in winter.
 9. Make a mound in the center of hole and spread out the roots over the mound. Fill hole with prepared mix of peat and soil (no manure) to about three-fourths full. Fill hole with water and let drain. Finish filling with soil. Do NOT tramp soil if it is heavy or clay type as this compacts the area around the roots.
 10. Mound roses with about 8 inches of soil to keep wind and sun from drying out stems.
 11. After buds begin to sprout, remove soil carefully so as not to break tender shoots. Usually this is first week of May, but depends on weather.
 12. If roses do not break dormancy (do not sprout) cut back farther and mound with pure peat moss, water well and keep damp. Never use fertilizer.
 13. When planting potted roses, remove container bottom first and gently uncoil some of the long roots. If they look dead, it is better to snip them off to white healthy roots. Remove rest of container. Avoid breaking clump. Potted roses are a "must" for summer fill-ins.
 14. After planting potted roses, water three times a week in the area immediately next to the graft (the old soil contained within the pot) for the first week or so.
 15. If leaves tend to wilt on newly-planted potted roses, spray plant with water as often as necessary. Light foliar feeding (half strength) may help.





Pruning of Roses

1. Prune with a slanting cut to an outside bud (unless plant is a “sprawling” type, then reverse the cut). Cut $\frac{1}{4}$ -inch above a good leaf with five leaflets. Use sharp cutting shears. A curved blade is less likely to injure cane than an anvil type, regardless of how sharp the anvil type may be.
2. Use proper narrow-bladed saw for cutting large canes, especially when removing cane from bud union.
3. In spring, cut back to clean wood above a good bud eye. Do not leave brown pith which indicates winter injury. Buds may break where there is brown pith and even carry on until roses seem ready to flower, then die back because of the increased demand on the damaged vascular system.
4. Do NOT cut back farther than necessary in this area. A rose has apical dominance and top buds will break out of dormancy first. The higher you cut, the earlier the bloom. But do NOT leave spindly canes or brown pith.
5. Prune out twiggy growth and crossing branches. Save three to five of the best canes — as high as you find good, healthy wood.
6. Cover cuts with tree wound dressing, nail polish or shellac to prevent cane borers from entering. This is most important.
7. Some Climbers bloom on old wood. Try to save as much wood as possible of this type. Remove about $\frac{1}{3}$ of the oldest canes at the base of the plant (usually largest and darkest canes). This should be done in spring to help keep plants vigorous.
8. General pruning throughout the year should be done with the following ideas in mind:
 - The bud which will develop into the next flowering shoot is in the axil of a leaf, so cut $\frac{1}{4}$ -inch above leaf with live bud.
 - Leave stems fairly long, as it requires from five to seven leaves (not leaflets) to manufacture enough food for each bloom.
 - When cutting blooms on newly-planted roses, cut stems short so the plant can manufacture enough food to become established.
 - Stems on established plants may be cut somewhat longer, but do not rob plant of its food-producing foliage unless necessary.

- If possible, make the pruning cut where stem is at least pencil thick. This will produce a bigger stem on the new shoot and a larger rose. The new cane will not be bigger than the cane from which it starts.
- Floribundas should be pruned after the entire cluster has bloomed. Cut back to a good bud in a leaf axil below the cluster; that is, remove cluster back to a good outside bud.
- Keep bud union as clean as possible by pruning off the corky growth and stubs. Use correct saw, then a sharp knife. Seal cut with a good sealer. This prevents disease from entering and helps to stimulate basal shoots. The life of the plant depends on the bud union.
- Sucker shoots originating below the bud union should be removed promptly. Dig soil away so you can see where the sucker shoot comes out of the understock. Use a sharp knife and be sure the "eye" of sucker is removed, then paint cut. Basals appear at or *above* bud union while sucker shoots appear *below* bud union.
- Blind ends sometimes appear (where no bud forms on new shoots). When this occurs, cut back to a good outside bud.

Rose Garden Maintenance

1. Feeding

- A newly-planted rose needs no food beyond that incorporated into the soil the first year, except perhaps occasional foliar feeding.
- Established roses should be fertilized soon after spring pruning, usually in mid-May, and every four weeks thereafter, but no later than August 15 so the plant will harden off before winter. Use any good commercial fertilizer such as 5-10-5 or 6-10-4 (6% nitrogen, 10% phosphorous, 4% potash). Iron chelates can be beneficial in our highly alkaline soils.
- Foliar feeding between regular feedings has proven beneficial in this area. Foliar fertilizer can be added to the solution of regular spray. Foliar feeding can be continued until frost without damage to plant.

2. Watering

- Sandy versus clay soils: sandy soil may require three waterings a week, whereas some clay soils need to be watered only every two weeks. Always check the soil to a depth of 3 or 4 inches to determine if water is needed rather than checking only surface appearance.
- Water thoroughly. Roses need enough water to prevent roots from becoming dry at any time. Type of soil (as well as wind and sun) will regulate this.
- Water a few days before fertilizing and immediately after.
- Soaking around base of plants with a bubbler or similar device is preferable to sprinkling.
- Overhead watering, if done early enough to insure dry foliage by nightfall, is acceptable. Water standing on leaves invites diseases such as black spot and mildew.
- If roses are planted close to shrubs, hedges or trees, give extra water as competing roots will rob roses of necessary water.
- Miniature roses have smaller root systems closer to the surface of the ground and may require more frequent watering.

- Do not let ground dry out before a freeze. Water rose beds occasionally as weather permits during winter.

3. Mulching

- Mulching keeps down weeds, reduces the amount of water required and eliminates much of the work in growing roses. Keeping roots cool during the heat of summer is conducive to growth.
- Well-rotted horse or cow manure provides an excellent mulch. Another very good mulch is a high grade of sphagnum peat moss. Peat moss, if used, should be mixed into the top 2 inches of soil to avoid formation of a thatch which will repel water. A 2 or 3-inch mulch should be adequate.
- Grass clippings can be used, but they tend to mat down. Always apply clippings in thin layers to prevent heat accumulation.
- Dust mulching (keeping the top layer of soil loose) can also be used. Rake frequently to prevent soil from caking (crusting).

4. Treating Pests and Diseases

- Use spray only as needed and according to directions. Exception: In our higher altitude the amount of spray may be reduced from $\frac{1}{3}$ to $\frac{1}{2}$ and still give satisfactory results. Test proportions in your garden to see which give adequate control.
- Systemics have proven satisfactory, especially in smaller gardens where the cost is not prohibitive. Follow manufacturers' recommendations for the times of applications.
- Mildew is the disease most commonly encountered in our area. Treatment: Actidione PM.* Prune infested stems in the fall. Pick off all leaves after frost to remove spores. In cases of bad infestation, a dormant spray should be used. Mildew can be spread by water's splashing on leaves, so water carefully when you notice first signs of mildew.
- Isotox has proven a satisfactory control for most insect pests in the area. Follow directions. Spray both surfaces of the leaves as most of the trouble is underneath the leaves.

*Trade names mentioned are intended for information, and endorsement is not implied.

Ed. Note — Mr. Franson is co-chairman of the Committee on Education, Denver Rose Society.

First Annual Rose Clinic

The first Annual Rose Clinic will be held at the Denver Botanic Gardens on Saturday, April 13, 1968. The Clinic is sponsored by the Denver Rose Society, Mr. Garrett Rush, Chairman.

Mary Armstrong, representing the Corona Clipper Co. of California, will be featured. Miss Armstrong will lecture about and give demonstrations of rose pruning and care. In addition, the Denver Rose Society rosarians will have a Rose Information Booth and will demonstrate the correct methods for planting bare root roses.

The demonstration and lecture hours are 10:00 a.m. and 2:00 p.m.
There is no charge.



TEST GARDEN

BEVERLY PINCOSKI

DENVER BOTANIC GARDENS has been established as an All-America Rose Selection (AARS) official Test Garden. It is the twenty-fifth such garden in the United States and one which was badly needed in this area. Prior to this time there had been no rose testing site in an eleven-state area which included New Mexico, Utah, Nevada, Idaho, Montana, Wyoming, North Dakota, South Dakota, Nebraska, Kansas and Colorado. Previously established AARS Testing Gardens are as follows: one each in Washington, Oregon, Texas, Oklahoma, Louisiana, Missouri, Iowa, Minnesota, Wisconsin, Georgia, North Carolina, New Jersey and Connecticut; two each in Ohio, Pennsylvania and New York; and five in California.

Plant breeders send plants for consideration to each of the testing stations. They are trial grown under actual garden conditions for two years. During this period they are judged by an official trained AARS Judge. One judge is assigned to each garden. Mr. G. E. 'Casey' O'Donnell, member of the Denver and Boulder Valley Rose Societies, will be the Denver judge. He is Director of the Rocky Mountain District of the American Rose Society and a nationally accredited Rose Show Judge.

The roses are rated on foliage, bud and flower form, opening bloom color, finishing bloom color, floriferousness, substance, fragrance, stem, growth habit, vigor, hardiness, disease resistance and novelty. Only a few roses pass this rigorous test and are named All-America Rose Selections.

The AARS winners may be viewed also as the rose garden at Denver Botanic Gardens is an accredited AARS Display Garden. The new All-America award winners are planted in April. This gives the public a chance to see them growing and blooming before they are offered for sale the following September. They remain under code number until the names are officially announced during the first week in June. All AARS winners are identified by a green and white oval metal tag when sold.



American Heritage, AARS, 1966

Camelot, AARS, 1965



Mister Lincoln, AARS, 1965

Ivory Fashion, AARS, 1959



All-America Rose Selections

1969 to be announced Saturday, June 8, 1968

1968	Europeana.....	red	floribunda
	Miss All-American Beauty.....	pink	hybrid tea
	Scarlet Knight.....	scarlet red	grandiflora
1967	Bewitched.....	pink	hybrid tea
	Gay Princess.....	pink	floribunda
	Lucky Lady.....	cream pink	grandiflora
	Roman Holiday.....	orange-red	floribunda
1966	American Heritage.....	light yellow, tinged carmine	hybrid tea
	Apricot Nectar.....	apricot	floribunda
	Matterhorn.....	white	hybrid tea
1965	Mister Lincoln.....	red	hybrid tea
	Camelot.....	shrimp pink	grandiflora
1964	Granada.....	scarlet, nasturtium, yellow	hybrid tea
	Saratoga.....	white	floribunda
1963	Royal Highness.....	clear pink	hybrid tea
	Tropicana.....	orange-red	hybrid tea
1962	Christian Dior.....	crimson red	hybrid tea
	Golden Slippers.....	orange-gold	floribunda
	John S. Armstrong.....	deep red	grandiflora
	King's Ransom.....	chrome yellow	hybrid tea
1961	Duet.....	salmon pink, orange-red	hybrid tea
	Pink Parfait.....	dawn pink	grandiflora
1960	Garden Party.....	cream white	hybrid tea
	Fire King.....	vermillion	floribunda
	Sarabande.....	scarlet orange	floribunda
1959	Starfire.....	cherry red	grandiflora
	Ivory Fashion.....	white	floribunda
1958	Fusilier.....	orange-red	floribunda
	Gold Cup.....	golden yellow	floribunda
	White Knight.....	white	hybrid tea
1957	Golden Showers.....	yellow	climber
	White Bouquet.....	white	floribunda
1956	Circus.....	multicolor	floribunda
1955	Jiminy Cricket.....	coral-orange	floribunda
	Queen Elizabeth.....	clear pink	grandiflora
	Tiffany.....	orchid pink	hybrid tea
1954	Lilibet*.....	dawn pink	floribunda
	Mojave.....	apricot orange	hybrid tea
1953	Chrysler Imperial.....	crimson red	hybrid tea
	Ma Perkins.....	coral-shell pink	floribunda
1952	Fred Howard*.....	yellow pencilled pink	hybrid tea
	Vogue.....	cherry coral	floribunda
	Helen Traubel.....	apricot pink	hybrid tea
1951	none of the 1951 introductions were equal to the rigid AARS standards		

1950	Capistrano.....	pink	hybrid tea
	Fashion.....	coral pink	floribunda
	Mission Bells*.....	salmon	hybrid tea
	Sutter's Gold.....	golden yellow	hybrid tea
1949	Forty-Niner.....	red and yellow	hybrid tea
	Tallyho*.....	two-tone pink	hybrid tea
1948	Diamond Jubilee.....	buff	hybrid tea
	High Noon**.....	yellow	climbing h.t.
1948	Nocturne.....	dark red	hybrid tea
	Pinkie.....	light rose-pink	floribunda
	San Fernando*.....	currant red	hybrid tea
	Taffeta*.....	carmine	hybrid tea
1947	Rubaiyat.....	cerise red	hybrid tea
1946	Peace.....	pale gold	hybrid tea
1945	Floradora.....	salmon rose	floribunda
	Horace McFarland*.....	buff pink	hybrid tea
	Mirandy.....	crimson red	hybrid tea
1944	Fred Edmunds**.....	apricot	hybrid tea
	Katharine T. Marshall.....	deep pink	hybrid tea
	Lowell Thomas.....	butter yellow	hybrid tea
	Mme. Chiang Kai-Shek*.....	light yellow	hybrid tea
	Mme. Marie Curie*.....	golden yellow	hybrid tea
1943	Grand Duchesse Charlotte*.....	wine red	hybrid tea
	Mary Margaret McBride.....	rose pink	hybrid tea
1942	Heart's Desire.....	deep rose red	hybrid tea
1941	Apricot Queen*.....	apricot	hybrid tea
	California*.....	golden yellow	hybrid tea
	Charlotte Armstrong.....	cerise red	hybrid tea
1940	Dickson's Red.....	scarlet red	hybrid tea
	Flash*.....	Oriental red	climbing h.t.
	The Chief*.....	salmon red	hybrid tea
	World's Fair.....	deep red	floribunda

*no longer generally available

**denotes sectional recommendation

Pete Ponders Planting Roses

When planting roses where should the bud union be placed?

A good question in this climate — and debatable! A poll of top rosarians here reveals that many, including Denver Botanic Gardens, plant roses with the union an inch below ground level: plants require less winter protection (mounding) and are less likely to suffer during drought.

However, G. E. O'Donnell, an accredited AARS judge, in studies he made during the past 15 years found those roses planted with the union an inch or more above ground are longer-lived, more floriferous and less subject to crown rot. They need loose mulching in summer and mounding in winter. He reports roses planted with the union one inch or deeper, especially deeper, develop own-roots which may compete with the understock (this sometimes decays and encourages crown-rot). Paradoxically, his roses grown from cuttings planted six inches deep form healthy fibrous roots and, without competition, perform well.

Plant the bud union above ground? Below? In this climate: Yes!

Pete the Ponderer

EARLY BOTANISTS

in the Rockies

M. WALTER PESMAN

THERE IS glamor about the Rocky Mountains. It is hardly equalled anywhere else on the globe. The very names of "canyon" and "pinyon pine", (especially if spelled in the Spanish manner, cañon, and piñon) make you think of a mysterious well-hidden spot, bathed in sunshine, etched against the azure sky (be sure it is azure, not just blue).

The chaparral, the "purple sage", yucca, cactus, chico — they all have an appeal that can only be quite understood by the student of semantics.



Picea pungens, Colorado Blue Spruce

And yet, leaving out all glamor, there is still this "feel" of the Rocky Mountain region that "gets" you and that never leaves you.

Early explorers fell under its spell — even though Major Stephen H. Long, sent by President Monroe in 1820, pronounced the plains "the Great American Desert upon which nothing would ever grow." Doctor William Henry Brewer, Professor of Agriculture at Yale University, for instance, while on an exploration trip to the Rockies from July to September 1869, writes again and again of the "sublime landscape to the west — chain beyond chain and peak beyond peak, far off in that great unknown." About the Trout Creek region he says: "It was a glorious scene. The peaks were gilded by the last rays of the sun, and then the rosy tints lit up the clouds and sky." Having been indoctrinated by California just previously, it is interesting to note how he reacts to the flowers up Turkey Creek. "The glory of the day's ride was in the flowers, the beauty of which I have never seen surpassed." He continues: "Whitney (after whom Mt. Whitney is named) thinks they surpass even those of California. I do not think so, but they perhaps equal them. There is a large variety of conspicuous colors and surpassing beauty. A columbine is one of the most lovely flowers I have ever seen."

Following early explorers and botanists in their first wanderings about this Rocky Mountain region is an indoor sport that has unusual fascination. It gives you a vicarious experience of camping in the wild, wondering where the Indians and bears and mountain lions may be in hiding, what sudden adventures may befall you, and what wonders are in store from day to day.

Imagine reporting on the unbelievable geysers of Yellowstone National Park, the red rocks of the Garden of



"Just after crossing the divide between the east slope's major drainage systems at Palmer Lake, on July 11th (1820) the party encountered and collected the Blue Columbine, *Aquilegia coerulea*, in the scruboak thickets of that region." *Rocky Mountain Naturalists*, p. 14.

the Gods, the first glimpse of Pikes Peak, the Spanish Peaks, the Tetons!

Lewis and Clark made their explorations of the Northwest in the early eighteen hundreds — William Clark leaving his name scratched on the wall

of the spectacular "Pompey's Pillar" in Montana. In spite of this desecration, (or due to its publicity?) he became governor of this new Louisiana Territory.

Edwin James, Colorado's first bota-

nist, collected our state flower, the Rocky Mountain Columbine, near Palmer Lake on July 11th, 1820. His name is attached to our beautiful wax-flower, *Jamesia americana*, and to a large number of our native flowers, trees and shrubs. In some cases the plant is named: So-and-so jamesii; in other cases the designation James follows the botanical name, such as *Aquilegia coerulea*, James. The latter means that Edwin James was the first one to collect it.

Ten years later *Thomas Nuttall* (1786-1859) found new plants; his name appears frequently in such as *Potentilla nuttallii*, *Astragalus nuttallianus*, *Gilia nuttallii*, *Aplopappus nuttallii*, just to grab a few names at random. As an "author's name" it appears even more often.

Another ten years (1842), and here is the first Fremont expedition, to be followed by four others, all exciting reading. Captain John Charles Fremont has been called "the West's greatest adventurer", a highly picturesque character, "from the ashes of whose campfires have sprung cities."

Colorado's foremost pioneer botanical explorer, according to Professor Joseph Ewan, (who has ferreted out a great many interesting details about these early plant collectors) — was *Dr. Charles Christopher Parry*, who advertised our flora in the sixties (1823-1890). His name is deservedly attached to our beautiful subalpine Parry primrose (*Primula parryi*).

On a bold rock along the Bear Creek road west of Morrison, is a bronze marker, installed by the American Association of Nurserymen in 1928. It reads: "In Honor of Dr. A. A. Parry,

Discoverer of the Colorado Blue Spruce, 1852." Evidently somebody was careless about initials and dates, since Parry's Colorado visit was in 1862. (He climbed Pikes Peak on July 1, 1862.)*

It seems a pity that the present name for Colorado blue spruce is *Picea pungens*, Engelm.; up till recently Parry's name was attached to it as *Picea parryana*.

But we are getting away from trailing our early explorers and botanists. *Elihu Hall* and *J. P. Harbour* were with Dr. Parry in the summer and autumn of 1862, and their names are still attached to some beautiful beardtongues and other native plants.

Then there was *Thomas Conrad Porter*, the witty preacher-botanist, who brought together the first synopsis of the plants of Colorado in 1874, after having been with the F. V. Hayden U. S. Geological and Geographical Survey.

With *H. N. Patterson*, the painstaking plant collector, who influenced Professor *Ellsworth Bethel* to switch from chemistry to botany, and *Marcus Eugene Jones*, who came to Colorado College to teach, and who collected zealously for fifty years (he was killed in an automobile accident in 1934) — we have arrived at our present botanical era, so long permeated by the genial and capable Professor *Aven Nelson*.

Our short survey has given an inkling of the laborious — and often dangerous — toil connected with this early pioneering. All of these early explorers had to depend on the slow mode of travel: horseback or covered wagon. We can now cover in a day what took them a week or more.

*A plaque to honor C. C. Parry, discoverer of the Colorado blue spruce, was originally located in Bear Creek Canyon near Evergreen and was first dedicated in 1928. Because of new highway construction the plaque was taken down in 1958, and was relocated on a turnoff provided by the Colorado State Highway Department just below Evergreen.

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DENVER BOTANIC GARDENS

DENVER, COLORADO

This is a non-profit organization supported by municipal and private funds.

A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

SUMMER 1968



THE COVER

VENERABLE JUNIPER

Photograph Courtesy Lorraine Yeatts

THE GREEN THUMB

VOLUME TWENTY-FIVE, NUMBER THREE

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The Green Thumb

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DR. HELEN M. ZEINER AND BERNICE E. PETERSEN, *Co-Editors*

SUMMER 1968

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colo. 80206, or call 297-2547.

FOCUS

on

Acalypha hispida

in the

Boettcher Memorial Conservatory

PEG HAYWARD



Acalypha hispida, chenille plant

The genus *Acalypha* belongs to the *Euphorbiaceae* family, the kaleidoscopic spurges. Few families of plants show so much variety as this one with over 7,000 widely spread species. *Acalypha* was the name applied by Hippocrates to a nettle.

Acalypha hispida, chenille plant, is a striking tropical upright shrub bearing thin, scarlet tassels which suggest the common name. The shrub, native to India, may attain a height of 15 feet. Its leaves are bright green, hairy, oblong, pointed, slightly toothed, and 4 to 8 inches long. Small flowers in terminal racemes may be 18 inches long. The pendant spikes are made up of staminate or male pollen-bearing flowers which have no petals. The pistillate or female flowers are inconspicuous. A complete separation of staminate from pistillate flowers is characteristic of members of *Euphorbiaceae*. Other common names applied to this strange looking shrub are red-hot cat-tail, monkey tail, and foxtail.

Many interesting tropical plants may be classified as ornamental foliage plants, their brilliant colored leaves being the main fascination. Two *Acalyphas* in the Boettcher Memorial Conservatory collection come under this classification. *Acalypha wilkesiana* 'Macafeana', copper-leaf, which is a native of Fiji, is a robust branching shrub dense with bright red foliage. This plant might be mistaken for one of the crotons, another sun-loving plant of the South Sea Islands. The copper-leaf may grow to 10 feet high and is often used for hedges. Its large leaves are triangular in form with slightly scalloped margins. They are bronzy-green marbled with wide spreading blotches of bright red, pink, and brown giving a total effect of warm red. Insects often reduce the leaves to lacy outlines. The small, inconspicuous pistillate flowers appear in upright spikes with reddish tufts and the staminate flowers are brown in color and drooping.

Acalypha wilkesiana obovata, native to Polynesia, has large obovate leaves which are emarginate or notched at the apex. They are green, edged cream-white when young, and later change to copper with rosy-pink margins.

The foliage of *A. hispida* and *A. wilkesiana* may be cooked and eaten when young and some species have medicinal uses. The *Acalyphas* are enjoyed as house plants. Their brilliant display in the Conservatory attracts the attention of many visitors.

BOOK REVIEW

THE FRIENDS OF JOHN GERARD (1545-1612) SURGEON
AND BOTANIST, ROBERT JEFFERS. *Herb Grower Press*.

In this botanical, historical mystery, the life of John Gerard unfolds. A true story, it identifies a host of prominent professional people that influenced John Gerard through friendship, correspondence, and exchange of plants.

John Gerard, a noted Elizabethan botanist and surgeon, researched, wrote, and published *THE HERBALL* in 1597. In it he described over 1000 species of plants that grew in his garden at Holborn, England. His description and drawing of the blossom of a white "potatoe" with the quotation "it groweth in my garden" was a widely recognized achievement.

Unfortunately after John Gerard's death, there was considerable adverse comment concerning his integrity as a botanist, surgeon, and author.

In *The Friends of John Gerard*, Robert Jeffers, the author, is able by factual account of biographical details, not only from *The Herball*, but also from many pages in medical, botanical, and horticultural journals to vindicate Gerard's original botanical works. Gerard did perform a great service to botany and horticulture in England and in the world. Mr. Jeffers has traced Gerard's journeys through the fifteenth century English countryside from early references, so that a modern traveler may retrace Gerard's steps today.

Anyone interested in botany, medicine, or Elizabethan history would enjoy this book — an addition to any library.

GLORIA A. FALKENBERG



ANNUAL TERRACE and GARDEN TOUR

BARBARA BENTON

The Annual Terrace and Garden Tour, an activity of the Denver Botanic Gardens Guild for the benefit of Denver Botanic Gardens, will be held on Tuesday, August 6, from 10 a.m. to 8 p.m. It is hoped that this new, extended time will give more people than ever before an opportunity to enjoy the lovely and varied gardens on tour. Gardening experts will be available in each garden to answer questions.

In capsule form, the ten show gardens are as follows:

Mrs. Stanley Morse — 7 Tamarac Lane, Englewood. The country atmosphere of this large garden is enhanced by the distant mountain view, large ponderosa pine and aspen trees, and an extensive use of ground covers.

Mr. and Mrs. R. P. Davison — 5 Tamarac Lane, Englewood. Stone retaining walls, low evergreens and unusual shrubs are tastefully used in this spacious garden in a country setting.

Mr. and Mrs. Lawrence Bucher — 3090 S. Steele Street. A lovely waterfall and pool give added appeal to this garden which features a wide variety of flowers and its own small greenhouse.

Mr. and Mrs. Stanley Larson — 3230 S. Monroe Street. The variety of native trees and rock garden plants add interest to this well-manicured garden with its open view of the golf course beyond.

Mr. and Mrs. Arnold Gurtler — 3245 S. Steele Street. The ledge in the front of this open, year-round garden full of color is in contrast with the seclusion of the back garden with its several levels and variety of materials.

Mr. and Mrs. Edwin Glick — 201 Dexter Street. An unusual assortment of western plant material is unified by extensive use of rocks, chips and old railroad ties in this contemporary, grassless garden.

Mr. and Mrs. Bruce Alexander — 290 Dexter Street. A shady pathway leads into a sunny garden with various levels featuring roses and colorful annuals. Complimentary punch and cookies will be served here.

Mr. and Mrs. Robert L. Davis — 778 Hudson Street. This beautifully owner-maintained garden with its herbs, shade plants and numerous perennials, makes a true garden for all seasons.

Dr. and Mrs. Miles Markley — 1120 Hudson Street. The diversity of plants, including many roses and a superb vegetable garden, adds to the completeness of this "man's garden."

Mr. and Mrs. Alan Fisher — 1360 Race Street. This is a shady city garden with gnarled Russian olive trees, garden paths and lovely sculpture.

Tour tickets (tax deductible) are available at \$3.00 each and Box Supper tickets at \$2.00 each at the Gift Shop at Boettcher Memorial Conservatory, 1005 York Street, telephone 297-2348; Botanic Gardens House, 909 York Street, telephone 297-2547; or through any member of Denver Botanic Gardens Guild. Tour tickets will also be available at the individual gardens on the day of the tour. Make checks payable to Denver Botanic Gardens.

Bus transportation for a tour of all the gardens will be available from Botanic Gardens House, 909 York Street. For further information regarding departure times and reservations, call Mrs. David Stone, 377-5918, after July 15.

Box Suppers (including coffee or cold drink) at \$2.00 each will be served at Botanic Gardens House, 909 York Street, from 5:30 to 7:00 p.m. Tickets for supper must be purchased by Friday, August 2. Complimentary punch and cookies will be served in the Alexander garden, 290 Dexter Street.

An added feature of this year's tour will be a selection of door prizes, including flower arrangements and gardening equipment, and all ticket holders are eligible to win. The drawing will be at 7:00 p.m. the day of the tour at Botanic Gardens House. You do not have to be present to win.

IN APPRECIATION

We pay tribute to Helen Vincent — Mrs. Edward Vincent — long-time staff member of Denver Botanic Gardens, who recently retired.

Mrs. Vincent became Assistant Secretary-Treasurer of the Colorado Forestry and Horticulture Association in 1957. When that Association fused with Denver Botanic Gardens in 1960 she joined our organization.

Her services have been many and varied. We remember her friendly greeting to all who entered Botanic Gardens House; her knowledgeable answers to a thousand questions; her sense of tradition and of continuity.

We remember her contribution in the preparation of such special issues of *The Green Thumb* as the Rose Issue, the Iris Issue and the important number dedicated to the Boettcher Memorial Conservatory. An article on our Botanic Gardens House; a tribute to Len Shoemaker, one of Colorado's distinguished foresters; an article on a revered member, Clyde Learned — these give testimony of her skill.

Mrs. Vincent's last assignment as Editor of *The Green Thumb* culminated her career as a valued member of our staff.

ANNA R. GARREY

EXOTICS OF COLORADO

Impatiens

DR. HELEN MARSH ZEINER



Impatiens The Rose

Balsaminaceae, the balsam or touch-me-not family, is made up largely of succulent herbs, some of which occur naturally in various parts of the United States, and some of which are cultivated plants which have come to us from "faraway places" indeed.

Impatiens holstii, *Impatiens sultanii*, and *Impatiens balsamina* are among these exotics.

The first two have been used successfully as house plants for many years. Their habit of almost continuous bloom makes them very desirable. In recent years, they have become popular as bedding plants for shady places. They have proven so satisfactory that they appear to be replacing the less showy *Impatiens balsamina*, garden balsam, a popular bedding plant of grandmother's time. However, improved garden balsams which should hold their own with any competing species are now available.

Impatiens is a Latin word referring to the sudden bursting of the seed pods. As the pods mature, pinch one lightly — you will see why *impatiens* is a suitable name! The genus name *Impatiens* is often used for a common name for any member of the genus.

Impatiens sultanii is a native plant of Zanzibar. It is called *Impatiens sultanii* in honor of the Sultan of Zanzibar, in whose garden the plant is said to have been cultivated.

In addition to *impatiens*, this plant has the common names Sultana, Sultan's balsam, Zanzibar balsam, patience plant (a misinterpretation of *Impatiens*, for the plant is anything but patient!), and patient Lucy.

In nature, this species has carmine-red flowers with upturned spurs. The long leaves taper to a point and have scalloped edges. They are waxy and fresh-green in color. The watery succulent stems appear translucent.

Impatiens holstii is a native of East Africa. It differs from *Impatiens sultanii* in having brick-red or vermillion-scarlet flowers with downward pointing spurs, and small, ovate, coppery-green leaves. The succulent stem is striped with red.

Impatiens holstii is also called *impatiens* and patience plant. The intriguing name "busy Lizzie" (because it is always busy blooming) is another common name for this plant.

Over a period of many years, *Impatiens holstii* and *Impatiens sultanii* have been improved by plant breeding and hybridizing until it is almost

impossible to recognize the species. Many colors are now available, ranging from white through pink, rose, orange and scarlet to dark reds with a purplish cast. Leaves may be green, metallic, or variegated.

Since impatiens can be used as either a pot plant or a bedding plant, it can be enjoyed all year. Cuttings from impatiens used as bedding plants may be taken in July or August to provide young house plants which will be ready to bloom for winter use. These same house plants can be set in the garden in the spring, where they will increase in size and bloom during the summer. The cycle can be repeated many times, but do take cuttings for house plants instead of trying to dig the old plant.

From the Office of the President

To: All Plant Sale Volunteers

From the Board of Trustees and myself a most grateful "thank you" to all of you who contributed so effectively to the annual Plant Sale on May 10 and 11.

Despite the chilly weather on the first day everyone held his post gallantly and kept sales ringing up so that when the sun did break through on Saturday to bring more crowds out, near records were made in the overall results.

New notes this year added greatly to a general spirit of gaiety even in face of the low temperatures. The colorful balloons, the new red wagons, the spacious lay-out, the new shop in the conservatory south room, all contributed to attracting the crowds and making it easier for our customers to make their selections. Surely the growing reputation of this annual sale was given a fine boost this year!

And the dollar results, although not yet final, should be over \$6,000 net which provides such a substantial part of our yearly budget. Without this help in supplementing the city's allocation of operating funds much that is done in our gardens could not be accomplished.

Our very sincere thanks go out to each one of you volunteers, the various committee chairmen, those who have helped plan from the very beginning when the plants were ordered, the plant contributors and growers, the sales force, the efficient cashiers, the helpful "tote" boys, our grounds crew, and everyone else connected with this not only most vital financial project but also important public relations project of Denver Botanic Gardens.

FRAN MORRISON, *General Chairman*
Plant Sale Committee

JOHN C. MITCHELL
President, Board of Trustees

Plains Conservation Center

Progress Report

The Plains Conservation Center was only a wonderful dream a year ago. Now we are pleased to report that considerable progress has been made but much more needs to be done before the *real* Plains Center has been developed as envisioned by its officers and board of trustees.

About 600 farmers comprising the West Arapahoe Soil Conservation District have given the Plains Conservation Center nearly 2000 acres of beautiful plains land to develop under a 99-year lease. They are anxious to share the marvels of this vast area with the citizens of Metropolitan Denver, of Colorado, and of the entire nation.

These three square miles of the plains are adjacent to the Buckley Airfield on the south, which is only 25 minutes from the Colorado State Capitol Building. Good roads lead to the gates on the south and east.

Basically the plan is to develop an educational and recreational center showing the plains in its original condition, and depicting the life on the plains when the first homesteaders took up their claims of 160 acres of government land in the 1870's, 1880's, and 1890's.

Last June a *sod house* was begun but was not completed until October, to allow the 2-foot thick sod walls to settle from 7 feet to 6 feet in height. This had to be done before it was safe to put on the roof. This sod house will be furnished as it was in the sod house days, before the beginning of this century.

We are particularly fortunate to have an old cook stove, actually used for 62 years on the plains close by. It is still in good condition and could be used to bake thousands of large tasty loaves of bread again, if desired. An old coffee mill, actually used in a sod house 80 years ago, as well as a cream skimmer, a flour measuring cup and sifter, an old fashioned pancake griddle, and other pioneer utensils can be seen at the sod house.

In order to take care of recreation on the plains for individuals and clubs, a large *shelter house* has just been completed, minus plumbing, which we hope can be installed by summer. This shelter house can take care of about 60 individuals at a time.

Also about a mile and a half of gravel trails have been completed. We expect to add 16 miles of such trails soon, so that one can walk to places of unusual interest and see antelope, prairie dogs, jack rabbits, badgers, ground squirrels, coyotes, meadow larks, prairie horned larks, lark buntings (the state bird), and some 40 other species of birds; many species of rodents, and over 50 species of plains plants.

Soon we hope to build a plains pioneer museum, a sod school house, and a sod church, so that visitors can actually see and better understand how our first pioneer homesteaders lived. When complete we hope this Plains Center, near Denver, will be so attractive that visitors coming to Colorado, as well as citizens of Colorado, will be anxious to see it.

JOHN C. JOHNSON

President, Plains Conservation Center Association

MOUNT GOLIATH —

Past, Present and Future

SUZANNE ASH

"I believe that the Mount Goliath Nature Trail is one of the most valuable projects that has been sponsored by Denver Botanic Gardens and should receive much more support. It is the only thing of its kind in the area and should be of great value in enabling local people and visitors to learn and appreciate the many wonderful plants that are found at timberline.

"I also feel that this should be the start of a series of similar trails throughout the state in various altitudes and locations. These might be appropriate memorials to other distinguished plant lovers such as D. M. Andrews and Mrs. Kathleen Marriage."

The above remarks were made recently by George W. Kelly, long-time director of Colorado Forestry and Horticulture Association.

In 1932 a group of conservation-minded persons together with the United States Forest Service agreed that such an area was of value and set aside nearly 200 acres on the slopes of Mt. Goliath to be known as the Goliath Peak Nature Study Area. Many areas such as this have existed for years in a rather nebulous state with few enforced controls. Now the legislature has redefined and strengthened the controls on these areas to insure their preservation.

Richard G. Serino, District Ranger, Arapaho National Forest, describes Mt. Goliath as it exists today:

"The Mount Goliath Natural Area as it now exists consists of 160 acres in T5S, R73W, 6th P.M. Colorado, within the boundaries of the Arapaho National Forest. The area was classified under Secretary of Agriculture Regulation as a Natural Area on March 11, 1957.

"The principal reason for classification stems from a specific botanical importance, in this case, the presence of a large block of Bristlecone Pine (120 acres) and an area of 40 acres of alpine grassland which supports an excellent cross section of alpine flora.

"The area was set aside by the Forest Service with the technical assistance

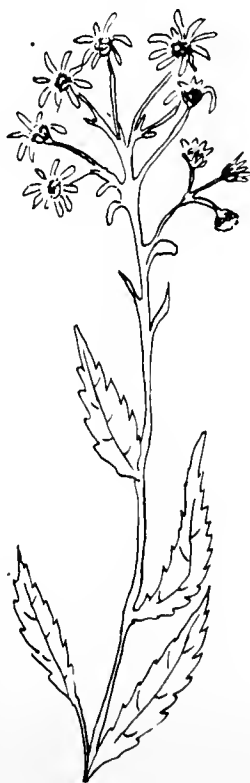
Paintbrush



Harebell



Senecio



Alpine Avena



of the Denver Botanic Gardens who recognized the value of maintaining this valuable legacy.

"Management objectives are aimed at maintaining the Goliath Natural Area. Development sites will be located away from the botanical areas and careful design and planning will be the rule in locating trails, parking and other needed facilities to not disturb the botanical features. It is hoped that the Denver Botanic Gardens will continue to serve as an Advisory Group in the management of Mt. Goliath."

Education and Research on Mt. Goliath

Dr. Louis B. Martin, Director of Denver Botanic Gardens, projecting into the future sees the possibilities of Mt. Goliath for education and research:

"The Denver Botanic Gardens is allowed cooperative use of the Mt. Goliath native plant area by the U.S. Forest Service. This is a unique situation. No other botanic garden or arboretum in the United States has an alpine plant unit. Equally unique is the fact that the educational activities sponsored by the Gardens at Mt. Goliath, are conducted not by staff but by very knowledgeable volunteer guides.

"The Forest Service has ruled that the native plant area is for education and research only. No picnic-hiker type of trail is to be established. A few educational signs may be placed at points of significant plant, animal and/or geological interest. These signs are to be of interpretive design rather than the usual plant or animal identification type.

"As a supplement to a trip to Mt. Goliath, the Gardens can offer the use of the Walter S. Reed property. Located 10 miles north of Evergreen on upper Bear Creek, a stop there (about 8000 feet) could be used to compare flora with that found at the alpine zone (11,000 feet).

"At the moment, serious research programs on Mt. Goliath are not contemplated. This is not to imply that the Gardens would not cooperate with individuals or groups who might sponsor research. The Gardens indeed would encourage any such offers. Finances do not permit extension of the Gardens' staff into research. Before any research is planned for the Mt. Goliath area, the cooperation and approval of the Forest Service will have to be given.

"At the time research can be initiated on Mt. Goliath, the least involved type would be ecological studies of plants, animals and geology or some combination of these. Limited goals, appropriate for senior term papers and master's degree theses could be accomplished in one or two summers. Research involving more detailed studies certainly is possible for the Ph.D. candidate. Again the Gardens can offer some help and encouragement through use of the Evergreen property. There is a small cabin which, with a minimum of repair, could be used as summer headquarters by one or two students.

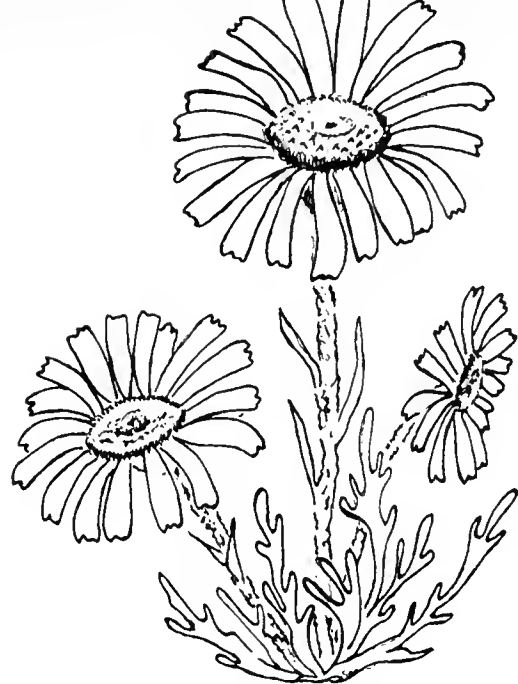
"As the Gardens develop, service to the people of Colorado must expand. Well-organized programs of education and research using the Mt. Goliath natural area certainly will be a major contribution to that segment of the public, seeking more scientific knowledge of plant behavior."

Mt. Goliath has been preserved for us today because there were far-sighted persons in the past. We must accept the challenge to preserve and study this area, and similar areas, for generations in the future.

Plant Associations in the Rocky Mountain Area

M. WALTER PESMAN

Alpine Goldflower



Ponderosa pine is almost sure to draw attention first of all: it dominates the foothills, introduction to the mountain mysteries. Just as one's mind is most alert to the wonders to come, here is this robust, sturdy pine, single or in small groups, with long, dark green needles and yellow-brown or even reddish-brown bark on older trees. (Younger trees have a blackish bark, which accounts for the name "black jack.") There is often a rockpile at its base, which protected the young seedling, when protection was needed.

Being on dry, sunny slopes, there are comparatively few other plants with ponderosa pines. Mountain mahogany is to be expected and squaw currant, *Ribes cereum*. Three-leaf sumac, *Rhus trilobata*, and Rocky Mountain sumac, *R. cismontana*, are common in spots; native roses and coralberries may occur singly or in larger groups; thimbleberries, *Rubus deliciosus*, and, a little higher, bush rockspirea, *Holodiscus dumosus*, are sure to draw attention when in bloom.

But now look at the less sunny, northern slopes, and the entire picture changes. The rugged individualism of our pines has given way to the "welfare state" of massed Douglas firs, *Pseudotsuga taxifolia*, ranged tier upon tier, covering the entire slope with only an occasional Rocky Mountain maple, *Acer glabrum*, showing its round outline against the serrated evergreens. In spring or fall large groups of native ninebarks, *Physocarpus*, will show up in bronze or white masses.

Again, all these are easily recognized and there is no mistaking Douglas fir for anything else at this elevation of 6 to 8,000 feet. There just is no other tree that looks like it. (For the Colorado blue spruce occurs only along stream bottoms, not high upon the slopes.)

Now let's look at an entirely different type of plant growth: the alpine region above timberline, sometimes referred to as the "dry tundra." No more trees, none of the larger shrubs even. But from the car we can see the waving plumes of bistort, the perky large heads of graylocks actinea (much more appropriately called alpine goldflower or sungod), fields of yellow alpine avens, sandworts, and other carpet plants.

The *oak chaparral* is sometimes called the southwestern broadleaved woodland. While southwestern California has 5½ million acres of the typical chap-

"Plant Associations in Colorado" is the last of the series of articles by the late M. Walter Pesman. You have enjoyed reading these excerpts from his unpublished manuscript, your enthusiasm and interest in botanizing in the Rockies has certainly been stimulated. To expand this interest a copy of *Meet the Natives* by M. Walter Pesman is very helpful. As the author says it is "an easy way to recognize Rocky Mountain wild flowers, trees and shrubs." The book is on sale in the Gift Shop located in the south room of the Boettcher Memorial Conservatory. — K.B.C.

arral, our Rocky Mountain region often has it in fringes along the upper edge of the sagebrush belt.

In the Grand Mesa country between Grand Junction and Glenwood Springs it is a sure altimeter; its boundaries follow almost exactly those of the foothills zone, 6 to 8,000 feet above sea level.

Scrub oak, mostly *Quercus gambellii*, is dominant. With it we find mountain mahogany and serviceberry, *Amelanchier*. Again, as in the ponderosa pine association, three-leaf sumac and coralberries are met. Apache plume, *Fallugia paradoxa*, and antelope-brush, *Purshia tridentata*, with its small three-lobed leaves and early fragrant yellowish bloom, are rare on the eastern slope but not too uncommon in the chaparral.

Two of my pet native shrubs, squaw apple, *Peraphyllum ramosissimum*, and false mockorange, *Fendlera rupicola*, are among those choice, rare things seldom found except in the chaparral or among the pinyons and cedars. It is an interesting and comparatively little-studied plant association, brilliant with its fall color, stubborn in its refusal to cross a north line stretching from Denver, Colorado to Logan, Utah.

Almost as adverse to going north is the *pinyon-juniper* vegetation, at least on the Atlantic slope of the Rockies. It does have one outpost north of Fort Collins, nobody knows how or why. Along the Western slope it stretches as far as the Snake River in Idaho; north of it is an attempt at holding the line with limber pine and juniper.

Just as the chaparral is sometimes characterized as "nature's unsuccessful attempt to make a deciduous forest" (Ramaley), so we might think of the pinyon-juniper association as her abortive effort at creating a coniferous woodland in a southern desert. But considered in its proper environment a pinyon pine has a great deal of fascination. For a backdrop, pinyon pine country needs a brilliant-blue sky. For local atmosphere, provide some partly eroded outcrops in weird formation — an Indian or two would be quite appropriate. Finally a luxuriously warm, sunny climate, and you'll be in the proper mood to appreciate this plant formation.

Pinyons are dotted about the landscape, miniature rounded trees with a highly picturesque architecture. Each individual invites a picture; the total landscape, as seen from a loitering auto, is different from any other. Short, stubby needles give a compact effect.

As indicated, junipers are boon-companions, particularly Utah juniper and oneseed juniper. Both are bushy and low branched, both have tight-scaly twigs, both have berries with a bluish bloom.

While this vegetation occurs at the same elevation as the chaparral (6 to 8,000 feet) it is a peculiar fact that the two do not mix readily; where the chaparral is well developed, the pinyon-juniper zone is poor, and vice-versa (according to J. C. Blumer). But such shrubs as mountain mahogany and antelope-brush are willing to associate with either, evidently of a more congenial temperament.

And so we could go on, showing how easy it is to go auto-botanizing — and how pleasant. Each trip makes the next one more interesting as new friends are added.

We could point out how to recognize the Englemann spruce forest; it is

between the Douglas fir below it and the true alpine fir above it. Underneath these dense, tall Engelmann spruces little grows but billberry and blueberry, with an occasional mountain ash, serviceberry or mooseberry viburnum. Heart-leaved arnica often manages to steal in where shade is a little less heavy.

We might picture a typically dense lodgepole pine forest, said to come in often as a result of fires in Douglas fir and Engelmann spruce forests. Lodgepoles are at home between 7,500 and 9,500 feet altitude in Colorado, 500 feet lower in Wyoming, and between 6,000 and 8,500 feet in Montana.

Even if you might have difficulty recognizing the yellowish tint of needles and the tight little cones, on passing by in an auto, there is no mistaking the naked trunks all of the same age. Undergrowth is practically impossible, except in a few open spots.

So far, in our imaginary rambles, we have paid little attention to the time element. That was careless. For some of the greatest thrills await us at special times of the year. Yes, and even of the day!

The time of the glorious aspen season may differ somewhat from year to year, but when the middle of September comes, our eye travels to the hills with a yearning glance for the golden patches. First on the higher tops, then coming down as the nights get cooler, the aspens display their autumn glory. You can continue this joy to the senses by going south. Even the beginning of October has fall color in Ouray.

Not until the middle of May can we expect too much of the spring glory in the mountains. Then it comes with a bounce: Lambert's loco, paintbrush, low beardtongue, wallflower, and chiming bells.

June is sure to dazzle the driver with drifts of red, pink, and white fairy trumpets, *Gilia*. A little later, fireweed steals the show. Great masses of it may be seen, even at high altitude, wherever the ground has been disturbed.

The time and place to see senecios is on the Vail Pass road in the middle of August.

And so it goes: thrill after thrill awaiting the auto-traveler at almost any time and at different altitudes — a continuous show, and all in technicolor!

Even the time of day offers surprises. Wait till you are driving in the shale country some evening before dusk and to your delighted amazement one after another of large star-shaped flowers unfold, creamy-white among silvery leaves — the large evening star, *Mentzelia decapetala*. You may even notice its aroma as it opens, attracting its nocturnal insect visitors.

L'envoi

In my future days, as time goes on, I shall have a large and valuable picture gallery. It will be colorful. It will have great diversity. And it will be of priceless value. I shall view its different pictures as my mood may dictate. I shall relish each with ever returning happiness.

For this will be my mind's collection of pleasant memories, relished in the past. Among them will be ocean sunsets, Venetian gondolas and canals, the Northern midnight-sun, and garden scenes of many lands.

But a large number of them will be unforgettable landscapes which I collected while driving through the Rockies.

We have to thank our modern gasoline carriage for taking us from the humdrum of cities and of our daily cares, into the glory of our mountains—winter or summer, day or night.

We can never be quite unhappy, or lonely, or poor, with such a picture gallery of the mind.

HEMEROCALLIS — getting to know them

AVALONNE J. KOSANKE

"The yellow lily is at this time called *Lilium luteum*. Another name at this time is not known. Some want to make it *Hemerocallis*, which as Athenaeus writes, is a flower which appears in the morning with the rising of the sun and disappears at night . . ." So wrote Rembert Dodoens in *The Cruÿdeboeck*, 1554, the first herbal published in the Netherlands. Linnaeus used *Hemerocallis*, *Genera Plantarum* ed.5, 151, 1754, from the Greek *hemera*, a day, and *callos*, beauty. Catalogs often list these plants under their more common name, daylily, again referring to the bloom which generally opens and closes within a 24-hour period.

GENERAL DESCRIPTION

The *Hemerocallis* is a hardy, herbaceous perennial monocot assigned to the lily family. It differs from true lilies in two important ways: it does not grow from a bulb, and its flowers are borne on leafless stems.

In overall size the species forms range from less than 1 foot in *Hemerocallis dumortieri* to over 8 feet in *H. altissima*. The usual commercial cultivars run 15 inches to 5 feet to satisfy varied landscaping requirements.

Daylilies possess a rhizome, a modified underground stem, which may spread extensively as in *H. fulva*. Various clones of this species are used to advantage in erosion control programs. Most cultivars, however, contain themselves to neatly rounded clumps as *H. lilioasphodelus* (formerly

H. flava), the lemon lily of grandmother's garden.

The leaves are heavily ribbed, linear, and distichous, two-ranked as in Indian corn and grasses, forming a ramet or fan. This characteristic may be seen in Fig. 1. The observant gardener will note many variations in leaf form and it is interesting to compare these with species' traits. Foliage width may vary from ¼ inch in *H. nana* to 2½ inches in *H. exaltata*; in length from 3½ inches in *H. plicata* to 45 inches in *H. citrina*. Leaves of *H. plicata* are neatly folded while most are strap-shaped, rarely plaited. *H. minor* is grass-like while *H. citrina* holds its leaves stiffly erect so they break or bend abruptly while those of *H. thunbergii* arch gently at 30 inches. The color may be light, medium or very dark green, even glaucous. It may be variegated in certain



Fig. 1. 'High Noon' (Milliken) Cadmium yellow self. Plant shows typical growth one year after planting single ramet. Note 23-bud stalk, two-ranked leaves.

clones of *H. fulva*. The foliage of some cultivars retains the evergreen habit of *H. aurantiaca*. These are listed as "evergreen" in the catalogs. They are more hardy in the south, though many of this type adapt readily to Denver's climate. Some of the loveliest forms and colors carry this characteristic. Daylilies listed as deciduous are hardy much farther north.

The scapes (flower stalks) are largely leafless, slender, erect and more or less branched near their tips. Widely spaced branching gives modern cultivars a chance to display several open blooms simultaneously. The scape rises from the crown of the plant and usually holds the flowers well above the foliage. On a well-grown, well-established plant, a dozen stalks may each produce 20 to more than 100 buds flowering over a period of two weeks or two months.

The flowers are borne from May till October depending on the species and varieties used in their development. Some plants are remontant, flowering a second time after a rest period. The lily-like blooms range in size from 2 to 8 inches in diameter. Except in the double forms, each has six stamens tipped with pollen-rich anthers. The pistil arches beyond them to discourage self-pollination. The base of the pistil is a three-parted ovary with seeds often forming in each of the three chambers. Unless seed pods are the result of a planned cross, they should be removed on formation to allow more energy to go into the next year's growth and to prevent inferior seedlings taking valuable garden space.

The funnel-form perianth is six-parted as in the lily. The inner three segments are petals, the outer three correspond to the usually-green sepals which form the calyx of other flowers. This perianth is tubular from the ovary

to the point on the segments to which the stamens are attached. From this point the tepals (inner plus outer segments) flare into any one of several shapes. The usual flower form is a bell or funnel shape, the funnel having a depth greater than its diameter. All species bear this type flower. Breeders have created nearly flat flowers, Fig. 5, and some of these approach the typical orchid shape. Others are more spider-like, Fig. 6-8. Some are rounded, others are very triangular. The former shape occurs when all segments recurve, Fig. 9, while triangles result from three segments recurving, or from three segments developing greater size. Sometimes one petal will develop greater width and length than the other five segments, Fig. 6. The cockeral or cockatoo form (not shown) applies to flowers in which some segments ascend while others recurve.

The segments vary in length, width and shape. They may be ruffled, twisted, pinched and curved. They may vary in texture enough to affect the shape of petals vs. sepals. Ruffling is considered a refinement to be desired, Fig. 17-18.

The size of the flower varies from about 2 inches in the miniatures to over 8 in the spiders and others. Miss Jessie frequently flaunts an 8-inch bloom, Fig. 8, and she is in excellent proportion to her scape and fountain of foliage. There should be a pleasing relationship between flower and scape and foliage. Hybridizers have become quite self-critical in selecting cultivars of good proportion. Catalogs list many which will enhance the smallest garden or the spacious public plantings.

The hours during which a flower is open varies according to temperature, climate and genetic factors. Diurnal daylilies tend to open during daylight

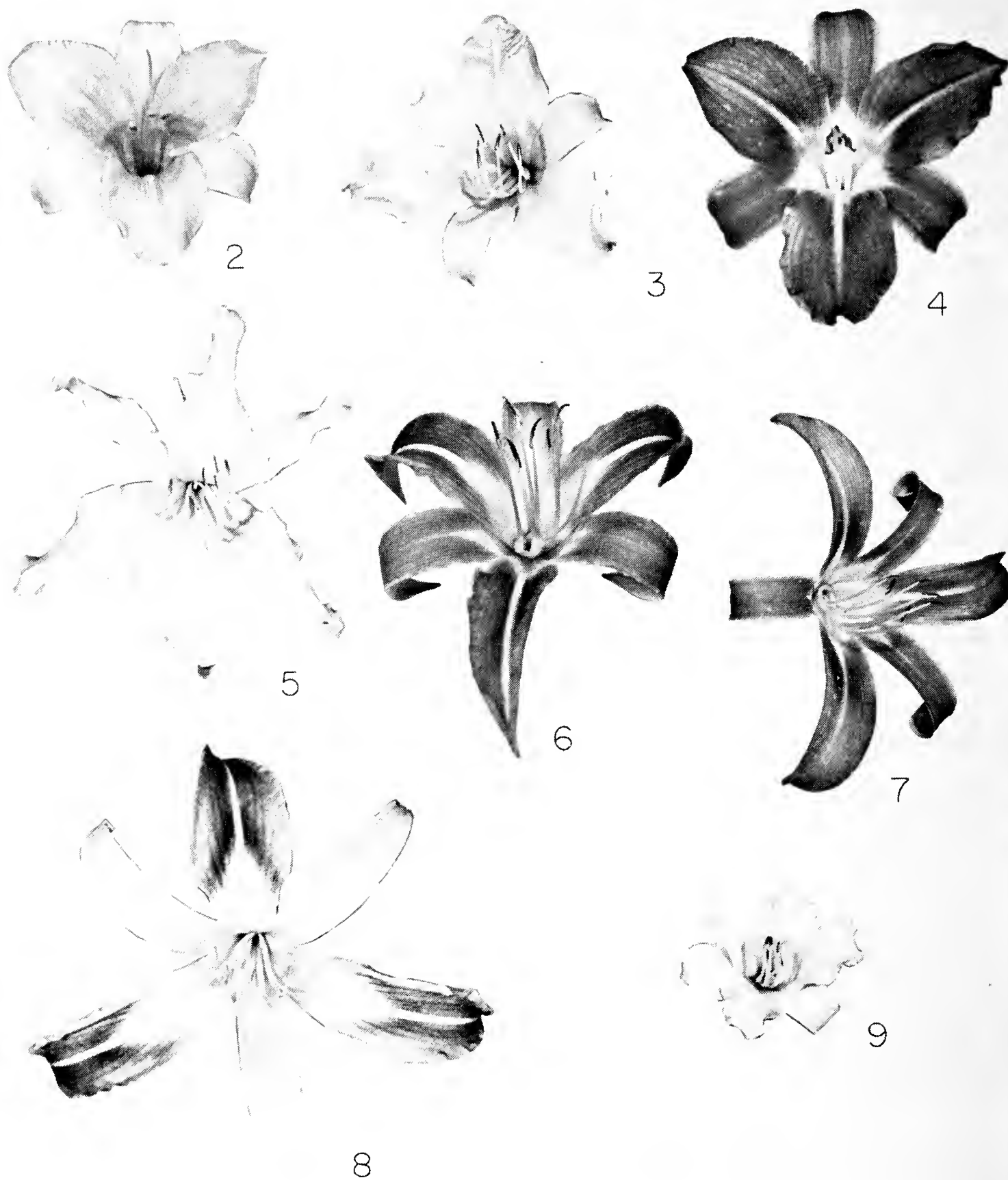


Fig. 2-9. FLORAL SHAPES

2. 'Temple Bells' (Hall) Typical funnel shape in melon shades.
3. 'Golden Song' (Kraus) Bell with segment tips pinched and ruffled.
4. 'Pageantry' (Hall) Recurving outer segments only. Deep velvety red.
5. 'Yellow Orchid' (Bach) Wide petals open flat. Segment tips twisted.
6. Zager's Red Spider — All tepals recurved; 2 petals twisted, recurved, third petal greatly enlarged, elongated.
7. Leonian Spider — All tepals recurved, petals widespread.
8. 'Miss Jessie' (Hardy) Lavender and yellow bicolor spider with all segments recurved. Always 6-8 inches.
9. 'Ringlets' (Kraus) Miniature bell ca. 2½ inches, bright gold, free flowering.

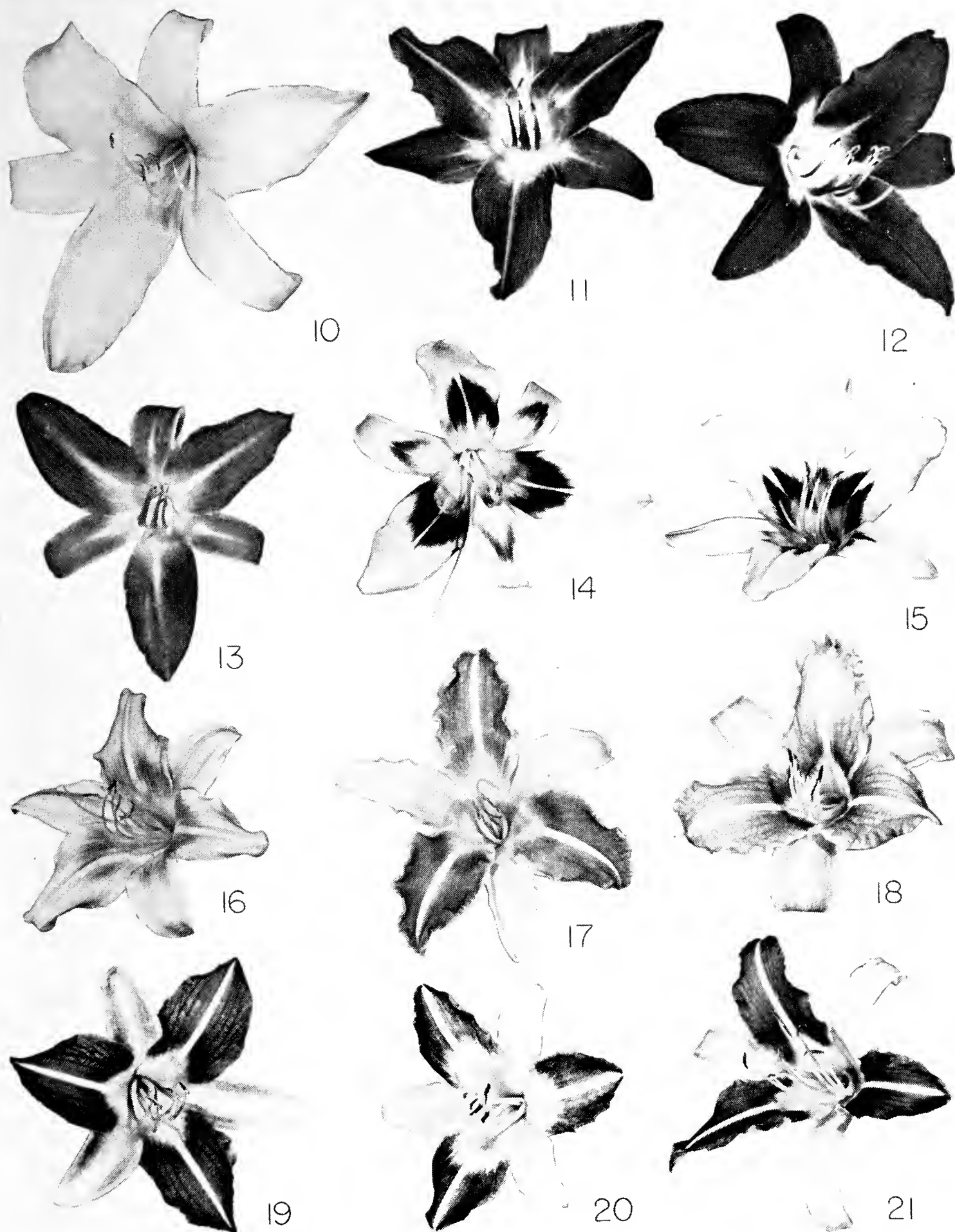


Fig. 10-21. COLOR PATTERNS

10. 'Midwest Majesty' (Sass) Huge yellow self. 11. 'Pride and Joy' (Hall) Currant red velvet self, spreading throat color, black anthers. 12. 'Ebony Prince' (Hensch) Black-maroon self with confined throat color. 13. 'Shining Plumage' (Hall) Red velvet with wide-spread segments, spreading throat color. 14. 'Mrs. David Hall' (Kraus) Cadmium yellow banded with triangular, sharply pointed carmine eye. 15. 'Come Hither' (Hall) Peach with purple eye interrupted by midrib color.

16. 'Heart Throb' (Hall) Pink banded with coral pink on all segments. 17. 'Frans Hals' (Flory) Yellow red bicolor with faint band on petals only. 18. 'Salmon Sheen' (Taylor) Salmon shades with deeper veining. Distinct color band on sepal edge. 19. 'Bold Courtier' (Nesmith) Rose-yellow bicolor, creamy midrib, visible vein color. 20. 'Howdy' (Bremken-Armstrong) Bold lemon and orchid bicolor. 21. 'Jean' (McDade) Very late, brick red and yellow bicolor.

hours though they may open anytime during the night and remain open throughout the next day. Nocturnal daylilies often open during the evening and close the next afternoon. These all descend from *H. citrina* and often carry the added character of fragrance. Since all *Hemerocallis* are insect pollinated, these night bloomers are predominantly light in color and are fragrant to overcome their nocturnal handicap. Extended bloomers last well beyond sundown and make ideal plantings around patios or other areas used in the evening. There is some progress in developing flowers which remain open for two or more days.

The gardener selecting *Hemerocallis* should note the season of bloom listed by growers. Some cultivars from *H. minor*, *H. dumortieri*, *H. middendorffii* and *H. lilioasphodelus* (*H. flava*) begin late in May. These species had few flowers per scape, small flowers and dwarf habits — characteristics which still show up in early flowering cultivars. The blooming season extends into September usually through the remontants which bloom a second time after a brief rest. This line all descends from the evergreen *H. X aurantiaca*. A few cultivars send up a succession of scapes over a long period of time. Such extended bloomers are usually prone to fewer flowers per stalk, though the same clone may bear many flowers per stalk in other areas and completely drop the extended bloom tendency. The same clone may also vary in its date of flowering from year to year depending on climatic and physiological conditions.

Gardeners who paint their home landscapes in colors of their choice will be entranced by the wide variety of *Hemerocallis* now available. Known species bear only yellow, orange or the fulvous color, the latter term referring

to an overlay of pink, red or brown on the orange or yellow flower. Hybridizers have used the pink clone of *H. fulva* 'Rosea' to produce most of the modern pinks. There are now startling reds, nearly blacks, all shades of yellow, orange, brown, melon, purple, flesh, cinnamon, hints of lavender and blue, increasing areas of green, and creams so pale as to appear white. These colors appear as selfs, Fig. 10-12, with one color for all segments, bicolors with petals and sepals differing, Fig. 19-21, bitones with two shades on petals and sepals, and polychromes with several colors appearing in each flower. There are brilliant eyes, Fig. 14-15, and halos, Fig. 16, and radiant patterns, Fig. 19-21.

The variety is exciting now and the hybridizers feel they have only begun to tap the possible combinations of color, size and form. *Hemerocallis* are no longer merely "gap fillers" in the garden, they are prized scene-stealers every garden deserves.

CULTIVATION TIPS

Hemerocallis planted in full sun will give a maximum number of buds per scape and promote shorter, upright stalks. They will tolerate shade for a portion of each day, and a few even like a filtered shade to show off subtle coloring. Bloom and vigor are reduced if there is root competition for food and water. The scapes become leggy and tend to lean out from shade or away from a wall. Since *Hemerocallis* tends to bloom toward the source of light, this factor should be considered in selecting the site. A row of daylilies all facing their blooms away from the garden path can be quite frustrating! Many cultivars demand full sun to develop their finest sheen and glow. Others may burn out or turn white without protection. Wilting increases markedly

when both heat and humidity are excessive.

There seems to be wide tolerance in soil requirements. Light sand to heavy clay will do if humus is added and drainage is good. Spading should be at least a foot deep with plenty of compost, leafmold or well-rotted manure worked in. This improves soil structure and holds both moisture and nutrients for the plant's use. The alkaline soil of Denver may produce pale, yellow-green foliage with substandard vigor. A pH of slightly more than 7.0 is desirable, and the gardener will do well to respect this requirement.

Good drainage is essential. In our area the normal rainfall must be supplemented with several deep waterings. A 10-inch soaking early in the spring and again just before blooming will pay off in increased size, substance and improved color of bloom. It also improves the general health of the plant. Once established, *Hemerocallis* have an unusual capacity for absorbing moisture and storing it in their fleshy roots.

The soil of our area is fairly rich and there may be no need for added fertilizer. Severely leached soil and old plantings may benefit from a 6-10-4 or 5-10-5 fertilizer early in the spring and this should be used in strict compliance with the directions on the package. It should never touch the foliage and must be watered in deeply. Excess nitrogen is harmful. It reduces winter hardiness and causes yellow spring foliage followed by coarse, rank summer growth. Scapes may be fewer with flowers inferior in their color, substance and ability to withstand sun and heat.

Dividing established clumps may be done whenever the size, quantity and quality of the flowers appear to be reduced by crowding. Generally it takes three years for a new planting to reach its prime. Some varieties seem never to require dividing, while others may need

it after five years. This division may be done at any time of the year the ground is not frozen. The optimum time is during the four to six week rest period which follows close on the heels of the flowering phase. The reason is basic, for when this dormancy ends, a rapid root growth ensues and bud formation for the following spring takes place. Transplanting during dormancy reduces shock and allows new growth to take place in the chosen location. It also permits sufficient root growth to eliminate much of the winter loss which plagues the too-late planting. If late planting cannot be avoided, a light mulch will cushion the plant against severe weather changes. A large clay pot upended also provides adequate protection for a new plant. It is suggested that September 1 may be the cutoff date for planting in our area.

It is best to dig the entire plant, remove the dirt, and then decide on what divisions can be made without injuring the plant. The leaves should be cut to within 6 inches of the crown at this time. Older root sections should be discarded. Even single ramets will soon grow into healthy plants. Commercial cultivars are often no more than a single ramet on arrival, but planting them in a well-prepared bed is all that is required for quick growth. (See Fig. 1.) Whatever the source of the cultivar, plant the new start as soon as possible to reduce loss of moisture and vigor. The planting hole should be a foot deep and the same across. Create a mound or ridge in the center of the hole and spread the fibrous, fleshy roots around it. Planting too deeply will result in browning, loss of vigor and retarded growth. Note the white leaf bases which mark the depth of original planting. Keep this junction of leaves-to-root no more than 1 inch below the surface of the soil. Spread

the roots again as the soil is worked around and over them. Firm the new plant in and water it generously. After this soaks away, refill the hole with more soil as needed. Leave a slight depression to catch a full share of future moisture for this young plant. Allow 24 to 36 inches each way between plantings for mature growth and less frequent dividing.

Once established, weed control is minimal. The heavy foliage discourages weed growth. Cultivation is necessary to break the surface crust, but it should be shallow to protect near-surface rootlets. The healthy fountain of foliage provides an excellent natural mulch both summer and winter. In winter it serves to collect added snow for winter moisture so precious in our area. Once young plants are established they need no additional mulch. Evergreen types of cultivars may benefit from something light like straw or pine needles, but this grower uses none at all.

A spring clean-up of dead foliage and other debris is beneficial. At this time last year's foliage strips easily away giving the new shoots a clean start. During the growing season it is good practice to remove diseased and damaged foliage as it appears. Spent flowers may be removed daily, but *Hemerocallis* tend to clean themselves if left alone. It is interesting to note modern cultivars are much improved in this respect. After blooming is completed, the scapes should be cut straight across close to the crown of the plant. Foliage should not be cut off for it is needed to manufacture food and mulch the plant. Removal also induces too much new growth which fails to harden off by frost.

POSSIBLE TROUBLES

Hemerocallis do not have many serious enemies. Those they do have

are seldom fatal, a point the gardener will do well to remember. A well-grown clump almost never dies completely from disease or pest damage though it may suffer considerably during any given season.

Winter damage appears as yellowish, malformed leaves with little vigor plus some root decay and crown loss. Late freezes cause brown leaf tips and a tattered look.

Too-deep planting may result in similar symptoms: low vigor, yellow-to-brown foliage, poor or no flowers. The plant may be re-planted at the proper level, or if the clone is a vigorous one, it may develop roots at the proper level of growth and "lift" itself for peak development next year.

Several insects can cause concern. The worst of these is the tiny thrip. It enters the crown and buds during their earliest stages of development and can destroy the inflorescence or deform it. Malathion, DDT or Lindane used according to direction will control thrips. Cutworms can damage buds and young foliage. Suggested control is DDT or Sevin. Tarnished plant bugs can puncture the bud tips and deform the flowers. The wasp in search of nectar gnaws the young buds. The mud-dauber does the same thing. Japanese beetles, cucumber beetles, the long-horned weevil, slugs, grasshoppers and the spider mite all find the *Hemerocallis* tasty. Chlordane will control all but the spider mite which should be limited early in the season with either Kelthane or Malathion sprays.

Several diseases can affect the day-lily, and the grower will do well to consult "*The American Horticultural Magazine*" Volume 47, No. 2 *DAY-LILY HANDBOOK*, Chapter 11a for the latest information in this field. This volume is now on file in the Helen Fowler Library.

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DUTCH ELM DISEASE *

GORDON J. HOFF, EXTENSION AGENT, ADAMS COUNTY

The dreaded Dutch elm disease is moving rapidly west through Nebraska and Kansas to the Colorado-Nebraska border. It can be expected to invade the Denver Metropolitan area and other Colorado cities in the near future. This means that knowledge and understanding of the disease must be attained and that prevention methods be put into practice immediately.

Fungus, susceptibility

Dutch elm disease, destructive to American elm, as well as other species, is caused by the fungus, *Ceratocystis ulmi*, which kills the elm by clogging water-conducting vessels. The fungus was introduced into the United States from Europe about 37 years ago and has spread from the Atlantic seaboard through the midwest.

The fungus is carried primarily by the smaller European elm bark beetle, which breeds in dying or dead elm trees or dead elm logs. The fungus grows and fruits extensively in the beetle galleries. The beetles, emerging

from the galleries, carry the fungus spores to healthy trees infecting them through feeding wounds.

The American elm is most susceptible while the Chinese and Siberian elms are least susceptible. All other elms fall in between these two extremes.

Importance

Hundreds of thousands of dollars have been spent in eradication control measures and in removing diseased trees. The city of Kearney, Nebraska has experienced an entire change in appearance of the town because of the loss of elm trees lining entire streets. Other cities have also experienced similar changes.

In addition to the loss of aesthetics and valuable shade, the cost of tree removal in many eastern and midwestern states has put a great strain on municipal operating budgets. No one knows the exact number of elm trees in the greater Denver area, but it has been estimated that elms, primarily American elm, comprise about one half of the Denver plantings. At a tree removal cost varying from \$60.00

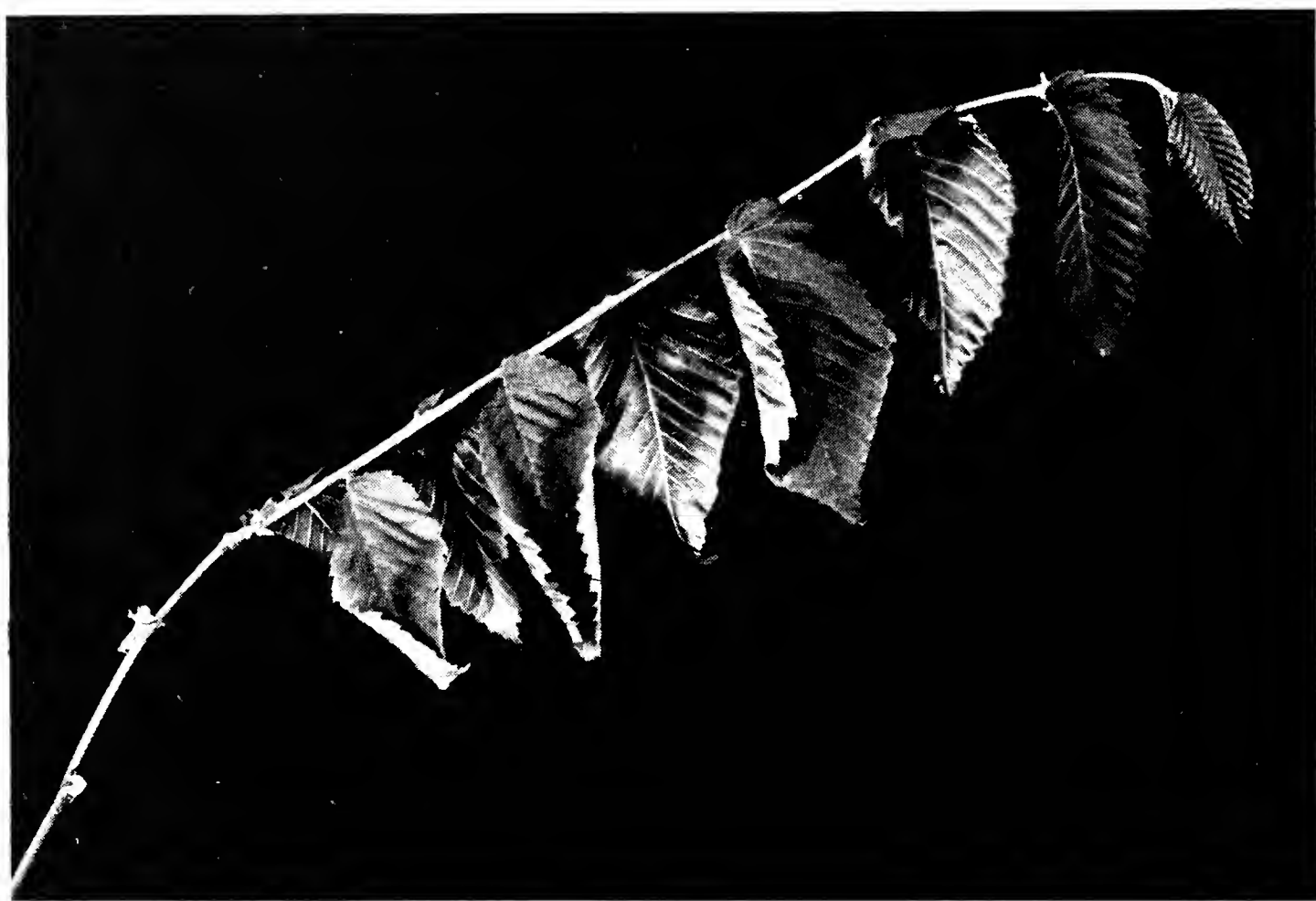
*Reprinted from *Metro Horticulture*, a bulletin of the Cooperative Extension Service, Colorado State University



A



B



C

Figure 1. Elms Showing Symptoms of Dutch Elm Disease. (A), extreme wilting and partial defoliation; (B), many branches dead, some abnormal twigs or shoot growth; (C), wilting on young shoot.

to over \$100.00 each, the cost of removing and disposing of a large number of diseased trees would be very great, even by the most conservative estimates. With the new air pollu-

tion laws preventing the burning of trash including tree limbs and stumps, the cost could eventually be almost as high for individual tree disposal as it is for cutting a tree down.

Symptoms

The most conspicuous symptom of the Dutch elm disease is the wilting of the leaves on one or more branches. Wilting may involve the entire tree in a few weeks. On the other hand, the leaves on only a portion of the crown may become affected during the season. (Fig. 1 a&b) As the leaves wilt they become dull green and remain attached to the twigs when they shrivel (a condition known as flagging). (Fig 1c) Elms which are low in vigor or partially dead or dying from other causes show fewer and less pronounced symptoms than do healthier trees. This condition may appear any time during the growing season. The wilting leaves wither and fall prematurely.

The sapwood of infected trees may be brown streaked or brown throughout. If a branch is cut across with a knife, this browning may appear as a circle of dots (Fig. 2) or a ring in the wood beneath the bark.

Positive identification of the disease can only be made in the laboratory because other diseases show symptoms very similar to those of Dutch elm disease.

Size of the tree and time of infection are two criteria which determine the life of a tree once it is infected. Some trees may live only one year while others may live longer. Once the tree is infected it is doomed because no cure is known to date. It is quite unusual for a tree to live longer than three years after being infected.

Control

Dutch elm disease can be prevented. Look ahead and set up preventive measures now. This is much easier and less expensive.

■ Control of the smaller European bark beetle. Attempts should be

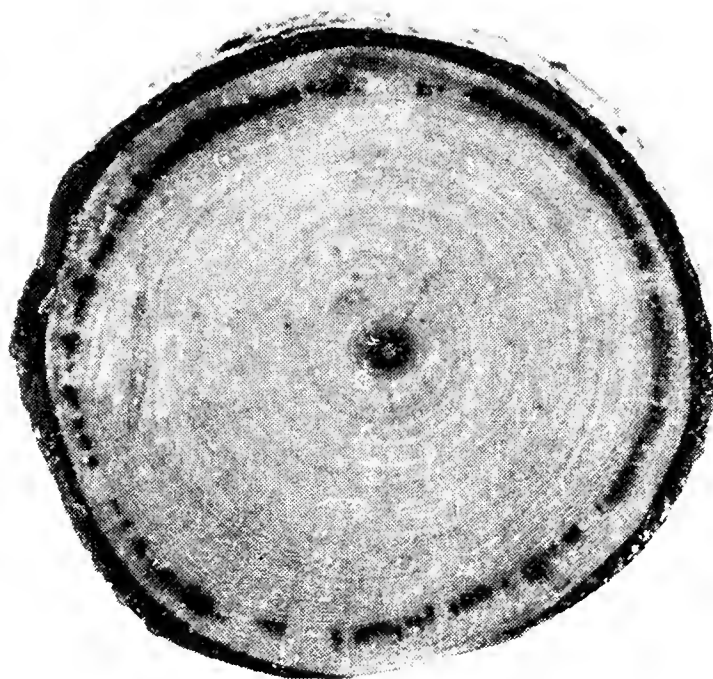
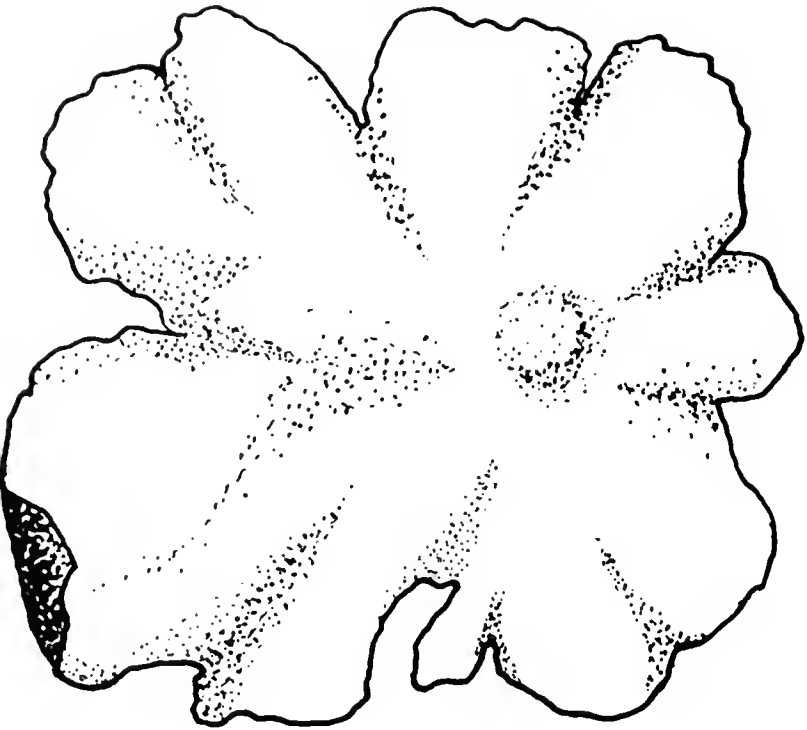


Figure 2. Cross Section of a branch affected with the Dutch elm disease, showing brownish discolorations in the sapwood.

made to eradicate the beetle by regular insecticide programs.

- Removal of all dead elm trees and woodpiles containing elm wood, which may harbor the bark beetles.
- By means of city ordinances, prevent importation of elm wood that may harbor bark beetles and/or the fungus.
- Maintain the vigor and health of elm trees through proper trimming, fertilizer and watering programs. This prevents colonization by beetles.
- Use mixed plantings containing resistant tree species to reduce hazard.
- Initiate community ordinances to move diseased trees and eliminate breeding places of bark beetles.
- Control measures should be applied to wild (naturalized) stands of American elm since they may bridge the gap between communities.
- Selective removal of street trees when aged trees need removal.

Prevention is the best policy! Plans for prevention must be initiated now and continued as a regular program. ■



THE REMARKABLE LICHENS

DR. ROGER A. ANDERSON

Umbilicaria Rock Tripe

CAN YOU IMAGINE two plants with vastly different evolutionary histories, structures and modes of nutrition forming such a close-knit partnership that they each almost lose their identity? If you can, you have some idea of what lichens are all about and why they represent such an intriguing biological phenomenon.

Each lichen is composed of an alga (called a phycobiont) which can photosynthesize and thus produce its own food, and a fungus (called a mycobiont) which can't. The two organisms live together in such a unitary way that the combination looks and behaves like a single organism. But lichens are more than just a close association of two unrelated organisms. They are the result of a delicate balance that is maintained between the partners, a balance that exists only as long as conditions are favorable for the growth of both the alga and the fungus. An imbalance in environmental conditions, such as excessive moisture, which favors the growth of one component over the other will result in a breakdown of the association.

This equilibrium is so sensitive that botanists have not succeeded in growing intact lichens under greenhouse or laboratory conditions for longer than a few weeks. Perhaps you noticed that all of the lichens transplanted into the Boettcher Memorial Conservatory on tree trunks and rocks deteriorated and disappeared in a very short period of time. The continuously moist, tropical environment was too much for these delicate unions.

Botanists have been successful, however, in isolating the two components of the lichen association and growing them separately. This has been accomplished with relative ease, but it has not been so easy to reconstruct a lichen from its isolated parts. Unless the culture medium is free of nutrients the fungus will not associate with the alga. Also, the culture must be subjected to slow drying or alternate wetting and drying in order for a lichen association to form. Under these conditions a rudimentary lichen thallus will develop and may even produce fruiting bodies. The fungal hyphae encircle the algal cells and to some extent the characteristic layers of tissue will differentiate; but even the most successful synthesis experiments have failed to produce a lichen which has the normal appearance of the same lichen in nature.

These laboratory synthesis and culture studies have provided an insight into the physiological relationships between the components of a lichen. There are apparently advantages and disadvantages for both organisms, though the phycobiont probably comes out on the short end. The mycobiont derives food, vitamins, and sometimes organic nitrogen from the phycobiont. The phycobiont,

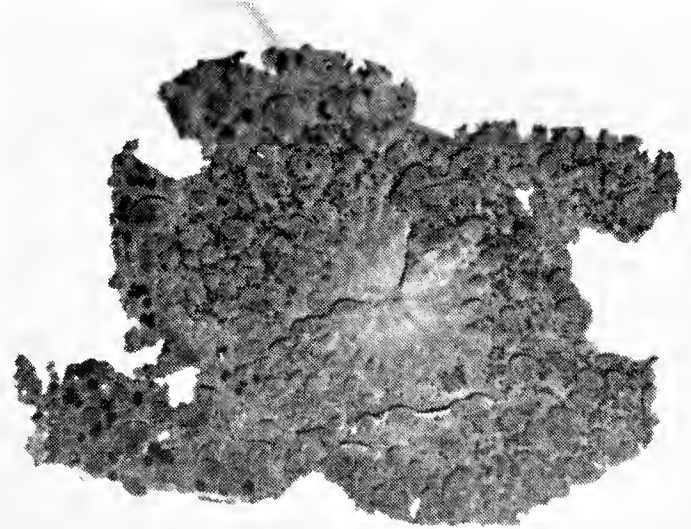
which is enveloped by fungal hyphae, benefits by receiving protection from high light intensity and abrasion. The mycobiont probably also supplies the alga with certain essential minerals or metabolites. The disadvantage to the phycobiont is that part of its food supply is stolen by the fungus. In the process of doing this, certain hyphae may penetrate some cells of the alga with an end result that the cells die. Even if cells are not punctured, the restrained parasitism of the fungus is still not an altogether happy prospect for the alga.

The gross morphology of lichens is usually determined by the mycobiont. Only in primitive lichen associations is the overall outline of the thallus due to the phycobiont. In these simple associations a filamentous alga makes up the bulk of the thallus and the mycobiont is present as a thin hyphal or cellular sheath over the surface of the filament. In higher lichens the mycobiont makes up the bulk of the thallus and is responsible for the characteristic growth form and color of the thallus. Several growth forms are easily recognizable. The most common ones are crustose, squamulose, foliose, and fruticose. The crustose growth form is generally the least differentiated and is tightly plastered to the substrate. It may be granular or warty or subdivided into pavement-like units. The squamulose thallus is made up of small scale-like, often lobed, units which may overlap each other like shingles or may remain dispersed on the substrate. The foliose and fruticose growth forms are the most highly developed. Foliose thalli are somewhat leaf-like and are variously lobed and folded. Fruticose thalli are shrub-like or tufted and may be erect or pendulous. The colors of lichens may vary too; they may be white, gray, or black, or various shades of orange, yellow, green, or brown. The colors are due to pigments produced by the mycobiont.

The success of this unique biological experiment in mutual cooperation can be dramatized by stating that over 15,000 lichens are known from all parts of the world and an average of about ten each month are described as new species. I should perhaps point out that the composite lichen does not have a name. Rather, the fungus and the alga each have a scientific name and can be classified in their respective groups. Thus, there are over 15,000 species of lichenized fungi in about 400 genera which are associated with an unknown number of algal species in about 26 genera. Seventeen of the genera are green algae, eight are blue-green algae, and one genus is of yellow-green algae. With the exception



Parmelia rudecta



Umbilicaria papulosa

of a few genera of Basidiomycetes, the fungi participating in lichen associations are Ascomycetes, the class of sac fungi.

If lichens are an unusual biological phenomenon, their reproduction is no less so. An obvious adaptive strategy of high value for the maintenance of the association is one in which small packets of the lichen thallus containing both components are dispersed. Thus the fungus and its food source are distributed at the same time. This is a much more efficient and safe way of reproducing than relying upon germinated fungal spores to come into chance contact with an appropriate alga.

Most lichens probably reproduce in just this manner. The small packets, which provide a means of vegetative or asexual reproduction, are of various shapes and sizes. Some lichens produce tiny powdery particles called *soredia*. Soredia consist of a few algal cells enmeshed in a spherical tangle of fungal hyphae. They are produced in small dome-shaped masses or linear rows on the surface of the thallus. When dispersed by wind or animals, soredia can germinate into a new lichen. Other lichens produce small club-shaped or minutely coralloid structures on the surface of the thallus. These are *isidia*, and they also include both partners. Isidia may break off and vegetatively form a new thallus. Still other lichens have no specially differentiated structures such as soredia and isidia, but reproduce by simple mechanical fragmentation.

A less common reproductive process involves a natural resynthesis of the lichen association. Lichens reproducing in this manner form fruiting bodies or ascocarps, but usually lack any means of vegetative reproduction. In this process ascospores, produced in small sacs in the ascocarp, are released and dispersed. When they germinate they produce a minute network of hyphae called a *prothallus* which is at first devoid of algae. The prothallus continues to grow until the food supply of the nutrient-rich ascospore is depleted. Presumably some prothalli can also derive nutrition by saprotrophic means from the substrate. The ultimate success of the prothallus, however, is dependent upon coming into a chance contact with an alga that may land on the mat of hyphae or may be overgrown by the mat. If the alga is suitable, an association of fungal hyphae and algal cells may develop which will lead to the formation of a typical lichen thallus.

Many Coloradans are familiar with lichens through the so-called "moss rock" industry which has developed into a thriving business in the state over the last several years. The term "moss rock" is an unfortunate misnomer from the lichenologist's point of view in that the organisms responsible for the natural colors and designs on the rocks are lichens, not mosses. But too many people are ignorant of the differences between mosses and lichens to attempt to change the name.

Moss rock is being used extensively for a natural decorative effect in both interior and exterior construction of a variety of buildings, including houses, office and apartment buildings, restaurants, and even grocery stores. Quite unknowingly this amounts to the most massive lichen transplant experiment ever performed, and the eventual result of the experiment may be quite uncertain.

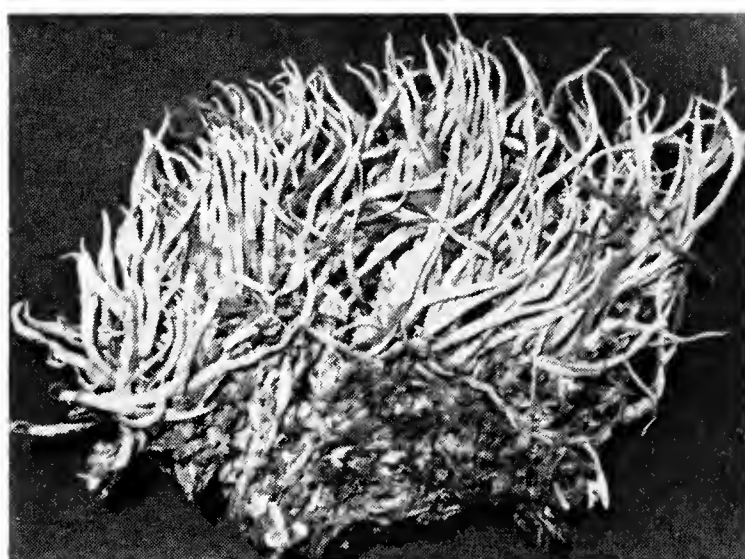
In the case of lichens used for exterior decoration, it is not unreasonable to assume that they will continue to live and grow even though transferred from a mountain environment to a polluted, city environment. In fact, the indications

are that most of the lichens transplanted several years ago are doing reasonably well. They are at least surviving in a large-city climate. However, lichens are known to be extremely sensitive to atmospheric pollution and many of the “moss rock” lichens may eventually die. Only one recommendation needs to be made in regard to their continued growth — leave them alone, *do not water* them.

Lichens on “moss rock” used for interior decorative purposes such as rock walls, dividers, and fireplaces present a different problem. And from as many inquiries as I’ve had, I gather that many people are curious about how to care for them. The first point to make is that lichens kept in a dry environment such



Cladonia pyxidata



Thamnolia subuliformis (alpine)

as inside a house, can’t respire and photosynthesize, and thus can’t grow. After a period of several months or years, they no longer have a capacity for assimilation, even if moistened, and are therefore dead. There is no cause for concern, however, because such lichens, though dead, will continue to maintain their shape and color and appear to be alive. So the answer on how to care for them is simple: do nothing. No attempt should be made to water them since this will allow for the possibility of discoloration and decay. An occasional dusting with a vacuum cleaner or feather duster is about all that’s required.

Those of you who are intent upon growing lichens in your own lichen garden may find them a little frustrating. A few simple pointers should help. First, stick with rock lichens since they are the most hardy. Second, collect the rocks from open, exposed sites at the lower elevations of the mountains, preferably from below 6,500 feet. Third, when you get them to your rock garden, orient the boulders in their natural position, that is, make certain that the side facing south in the mountains faces south in your garden. Fourth, do not water the lichens or fertilize them. They are adapted to a dry, nutrient-poor environment; watering would only upset the balance that exists between the fungus and the alga.

So the next time you head up one of our beautiful Rocky Mountain canyons, do me a favor — keep your eyes peeled. You may just see one of nature’s most remarkable experiments, the lichen. With about 600 kinds of them in Colorado you should have no trouble finding them. Good hunting!

Cherry Creek Parkways —

A Letter from S. R. DEBOER

For the hundred years of its existence, Denver's Cherry Creek boulevards are easily its top improvement. We have built towering office buildings, a beautiful city hall, an even more beautiful post office but for all around effect on the city and its plan Speer Boulevard and the Cherry Creek parkways surpass them all in public service, in daily use and especially in the effect they have on Denver's overall plan and its "image". Only a few of us remember that this was a piece of dry prairie through which meandered a dirty little stream flanked on both sides by rubbish piles and city dumps.

A Shaded Avenue to the Dam

Prejudiced as I am in favor of trees, I claim that the main items, the spectacular part of this top improvement, is in the line of towering elms. Even my tree-cutting engineer friends must admit the majestic beauty of the boulevards is created by the trees.

To continue this type of city parkway treatment right up to the Cherry Creek dam is suggested in this letter. I believe it is not only possible but actually easy, as public works go. It would give Denver a crosstown boulevard of great efficiency and beauty, outstanding above anything in Western cities. This world has only a few cities which have tree planted avenues. Paris, Amsterdam, and Berlin are a few outstanding examples and all of them have become tourist centers. I want to point to the ultimate goal of Cherry Creek. I appreciate the work done by the city public works department. They have added miles to the parkway system and I hope that they will be able to continue and to plant trees.

The master plan of Denver parks of 1949, nearly 20 years ago, suggests an express road in the creek bottom with the creek between the two roads. The plan has had little recognition and today with the many new bridges it is even more difficult. From University Boulevard east it might still be considered. It would leave the surface roads as park roads with access to the parks along it. The bridges would have to be raised and the creek bed stabilized but since the danger of floods is now definitely taken care of, I believe this plan should be seriously considered.

Terrace and Garden Tour

AUGUST 6 – 10 A.M.-8 P.M.



1969

All-America

Award Winners*

The All-America Rose Selections award winning roses for 1969 are Angel Face, Comanche, Gene Boerner and Pascali. This year the winners come in a beautiful array of colors with all three major classes of roses represented. Angel Face is a lavender floribunda; Comanche, a scarlet grandiflora; Gene Boerner, a pink floribunda; and Pascali is a white hybrid tea.

ANGEL FACE This is the first lavender rose to win an All-America award. A blend of rich deep lavender, a bud of grecian urn perfection, an exceptionally ruffled flower form, all topped off by a spicy, old fashioned fragrance.

The ruby buds, with just a hint of lavender, unfurl until when about one-third open the rich lavender color becomes apparent. The flowers open to fully double lavender roses of perfect form with petal edges waved, ruffled and touched by an edging of royal ruby. Blooms are large, four inches or more across, and usually come in clusters of several on medium length stems.

The plants of Angel Face are low, broad, evenly growing and well shaped and are particularly adapted to a location in the foreground of a garden. The bush is hardy, of good vigor, and produces constant bloom. The foliage, ample, but not dense, is a deep lustrous green with touches of copper, while the new growth is a complimentary 'ma-ron.

The long lasting uniquely colored flowers are particularly suited for the making of distinct and striking decorations. Angel Face is an arranger's delight as it produces an opportunity to work with a totally new color in roses. While the stems are not too long, they are strong and adequate for cutting.

Angel Face is the result of a cross (Circus X Lavender Pinocchio) X Sterling Silver.



Angel Face

*From press release by George E. Rose, director of public relations, All-America Rose Selections.

COMANCHE Comanche captures the warmth of a campfire and the excitement of a tribal dance. This brilliant scarlet grandiflora will add sparkle to any garden with its bold, high centered blooms borne in profusion on tall, well branched plants.

The fiery scarlet red buds unfold to fully double 4-inch blooms of more than 50 petals. The bloom is a vivid orange-scarlet backed by hot brick red. Each rose stands on a strong, cutting length stem.

The plant stands tall, yet is bushy and produces a steady succession of beautiful blooms for cutting and garden decoration. The disease resistant foliage is leathery green while the new leaves are rich maroon.

This rose with its brilliant scarlet blooms and vigorous plant will show up well in any part of the garden. Exhibitors and arrangers will delight in the perfect buds and excellent substance and form of the fully opened flowers.

Comanche parentage is Spartan X (Carrousel X Happiness).



Comanche



Gene Boerner

GENE BOERNER The only pink rose to receive an All America award for 1969 is this new floribunda. The rose was named for the late Eugene S. Boerner, dean of American rose breeders and originator of more than 160 patented rose varieties.

The blooms are deep clear pink in color. It is in flower almost constantly, repeating quickly throughout the season. Bud and blossom form are uniformly superior. Buds are medium long and pointed. They open slowly with an interesting spiral effect unfurling into clean full flowers. Blooms usually reach 3½ inches across with about 35 petals. The flowers are borne in clusters and frequently on long cutting stems of 10 or 12 inches. The blooms have a slight fragrance.

The plant is upright and very symmetrical because of its free branching habit. The handsome plant is well filled with foliage and remains clean and green throughout the entire growing season.

The flowers last well when cut for arrangements and are an ideal color choice for almost every interior decor.

PASCALI Whether intended or not, Louis Lens of Belgium hit an appropriate descriptive note in the naming of his fine new prize-winning white hybrid tea rose. For a rose to best symbolize "Paschal" or Easter, this is just about as perfect as a rose could be. Pascali is probably the whitest white to be found among today's popular hybrid tea varieties.

The flowers are remarkably beautiful in form, regardless of weather or season. Graceful, urn-shaped buds open to medium sized blooms with 35 to 40 petals which hold their high bud-like center very well, even until the outer petals drop. Fragrance is very slight.

The plant is an excellent one, erect in habit, vigorous and well clothed with bright green foliage. It is markedly resistant to mildew.

Pascali, in addition to its All-America award, won a gold medal at the Hague, a silver medal at Baden-Baden, first certificates at Rome and Paris and



Pascali

certificates of merit at Geneva, Madrid, London and Vienna.

The parentage of Pascali is Queen Elizabeth X White Butterfly.

Thorne Ecological Foundation

MARY JANE FOLEY

Throughout the history of Western Civilization, man has been at odds with his natural environment. It is only in recent times that Western man has (in his 24-hour-a-day effort to survive) paused to step back and look at the natural world that he has been exploiting throughout his history. He is realizing that clear streams and blue sky have an intangible value upon which he is not able to improve, and he is recognizing that his technology has now given him the ability to survive without exploiting his environment.

The Thorne Ecological Foundation exists in the belief that man can live in harmony with his natural environment, but that this is a relationship that must be built on understanding. Ecology, which is simply the study of the effects living things and their environment have upon each other, is the logical tool with which to build this understanding. The Foundation's goal is to help people appreciate the ecological principles that govern the processes of the biological world, so that we can apply these principles to preserve and improve the quality of our natural and man-made environments.

The annual Seminar at the Foundation's Aspen Center for Environmental

Studies brings together national leaders of industry, government, education, social sciences and the arts. Through field-sessions, discussions and lectures, they review nature's rules and the part man and his system of values play in the natural world. This is not merely a meeting of conservation-minded people who agree with each other, but people whose ideas of man's role in the world differ greatly, and who are attempting to better understand what ecology is, as well as each other's point of view!

The Foundation also acts as a clearing house, bringing together environmental problems and those environmentally-oriented organizations that might solve these problems. The Foundation cooperates with, and makes its facilities available, to many such organizations.

The Thorne Ecological Foundation's educational activities are directed toward both children and adults. It sponsors the Junior Natural Science School, in Boulder and Denver, for children from second grade through high school. The school is arranged as a four-week series of field trips where the children discover the subject matter in its original setting.

For adults, classes are sponsored in cooperation with the Denver Museum of Natural History. Classes, with numerous field trips, cover such subjects as anthropology, geology, plant ecology, animal ecology, astronomy and plant identification.

In summer the Foundation cooperates with the National Park Service in holding a series of seminars in Rocky Mountain National Park. The University of Colorado Extension Division offers college credit for these classes to those who desire it. The seminars are open to any interested person.

In the area of research, Foundation members are investigating the effects of visitor use on alpine tundra areas, and the population and distribution of birds. The Environmental Design Systems Laboratory, a research-oriented branch of the Foundation, concerns itself with designing the man-made elements of environment, such as homes, public buildings and cities.

The Thorne Ecological Foundation began 14 years ago as a non-profit corporation to acquire and preserve land of particular value to the natural sciences. It has been given several tracts of land to preserve in their natural state for research into and demonstration of ecological processes. One of these areas, Hallam Lake in Aspen, is the home of the Aspen Center for Environmental Studies. Other projects are planned near Boulder and Walsenburg.

The Foundation publishes periodic bulletins concerning its research activities. It sponsored publication of the University of Colorado Museum's book, *The Natural History of the Boulder Area*, and published the *High School Science and Mathematics Journal*, featuring outstanding articles resulting from the Colorado-Wyoming Bi-State Science Fairs.

Since its origin, the Foundation has worked quietly but actively. With the tremendous growth of interest in environmental studies of the past few years, the Foundation has come to realize that it could benefit more people if they were more aware of its activities. It encourages people to become Friends of the Thorne Ecological Foundation. It will be glad to answer any questions or supply further details about any of its programs. Inquiries may be directed to: Thorne Ecological Foundation, 1229 University Avenue, Boulder, Colorado, 80302.

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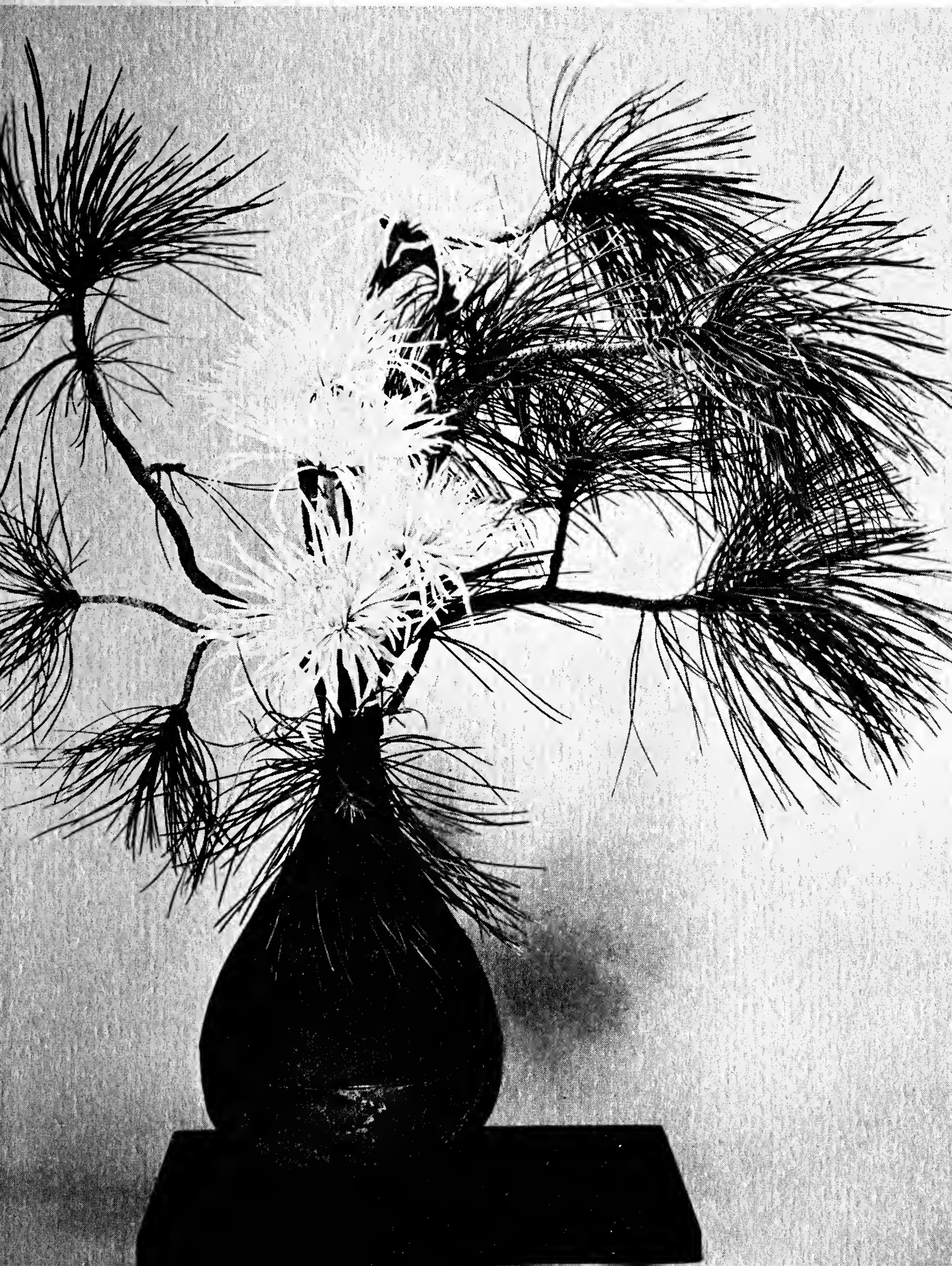
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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden center around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

AUTUMN 1968



THE COVER

AUTUMN ARRANGEMENT

Photograph by Jack Fason

THE GREEN THUMB

VOLUME TWENTY-FIVE, NUMBER FOUR

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The Green Thumb

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DR. HELEN M. ZEINER AND BERNICE E. PETERSEN, *Co-Editors*

AUTUMN 1968

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library at Botanic Gardens House.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colo. 80206, or call 297-2547.

FOCUS

on

Bougainvillea

in the

Boettcher Memorial Conservatory

PEG HAYWARD



Bougainvillea

The flamboyant bougainvilleas, strong, woody, rambling vines with long spikes of curious flowers produced in overwhelming quantities, have remained in popular esteem for many years, lending color and romance wherever they are found. *Bougainvillea* belongs to the four o'clock family, *Nyctaginaceae*. The first specimens were collected in Brazil by Louis A. de Bougainville on his voyage around the world near the end of the eighteenth century, and it is in his honor that the genus has been named.

What appear to be the flowers are really trios of paper-thin, brilliant-colored bracts, or scalelike leaves, which form perky geometric frames around the true flowers. This accounts for the common name, paper flower. The bracts are cordate-ovate and are distinctly veined. The flowers, usually in threes, are small and tubular, each partly adhering to the base of a bract. The long, ridged calyx tube is greenish or cream colored, often tinged with the color of the bracts, and opens at the end into a tiny, frilled flower, either white or yellow. The stems of the vine are armed with spines which assist the plant in its climbing and

rambling. Small triangular leaves, either smooth or hairy, are alternately placed along the stem.

There are many varieties of *Bougainvillea* and a host of hybrids grown throughout the tropics and subtropics and in greenhouses. Hybridists have created exotic shades of salmon, orange, gold, and red. A white-bracted variety has been cultivated more for its rarity than for beauty. All of the known varieties are derived from four species: *B. spectabilis*, *B. glabra*, *B. peruviana*, and *B. buttiana*.

Bougainvilleas in several different colors may be seen in Boettcher Memorial Conservatory. *Bougainvillea glabra*, which has purple-magenta bracts, is probably the most common. Its leaves are bright green and smooth. *B. spectabilis* has the largest individual floral bracts of the group. They are deep rose color and borne in immense trusses. The foliage is large and heavy, dark green, and more hairy than *B. glabra*. Afterglow is a variety with yellowish-orange bracts which change with age to salmon and finally light rose. Sometimes the sprays show all three colors at the same time.

The sun-loving bougainvilleas grow easily in any soil and thrive with little attention. They bloom nearly any time of the year and the bright-colored flower bracts will remain fresh and lovely for months.

Bougainvillea bracts are sold in Mexican markets for a tea recommended to relieve coughs. However, the striking vines will no doubt be remembered far longer for their cascading sprays of breathtaking color.

THE CHARMING HOUSELEEK

R. G. MYER

Aeonium arboreum, commonly known as houseleek, resembles those familiar members of the genus *Sempervivum* known as hen and chickens. Both genera belong to the family *Crassulaceae*. Houseleeks are primarily foliage plants and very seldom bloom.

Their culture is simple. They require a lot of sun on patio or flower bed during summer but must be treated as a house plant during winter. They do not like too rich a soil nor too much moisture, especially in the winter. If plants get dry the leaves will droop but will revive with a good watering.

They are easily propagated. Place rosette with 1½ inch stem in pot filled with 1 inch of drainage in bottom. Fill balance of pot with good garden loam. Water well and set out of sun for three to four weeks until rooted.

Like any plant, a leaf will turn brown and drop off. The only insects which have ever bothered mine are mealybugs, and they are easily controlled with Malathion.



Christmas IS Coming

CATHY PETERSEN

Let us help you plan a gala holiday.

For your complete Christmas shopping, visit the Denver Botanic Gardens Gift Shop during our annual Christmas Sale, Friday and Saturday, November 29 and 30, 10 a.m. to 4:30 p.m.

LIGHT UP YOUR HOUSE for the holidays with candles and holders in new sizes, colors and designs. Candle rings, made of rich velvet leaves and fruits (real enough to eat) will add that special touch to your decor.

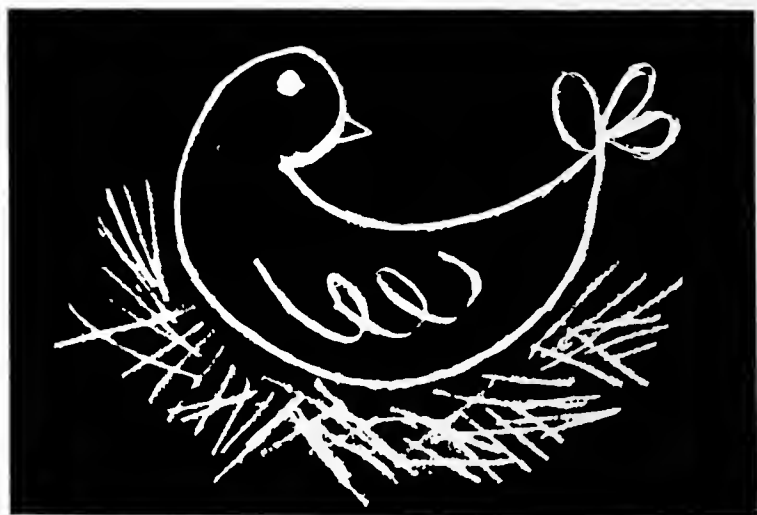
FRAGRANCE CORNER will feature calico sachets reminiscent of yesteryear, spicy pomander balls, and, reviving a charming eighteenth century custom, sweet bags to tie on your favorite chairs. Potpourri supplies for do-it-yourself gifts will be available.

THE WORKSHOP has made many beautiful plaques to give your house the most elegant look ever. Our new "partridge in a pear tree," offered in several sizes, will be ready to hang from a chandelier, over your mantel or at any focal point of your room.

The famous wreaths and charming cone angels will be available again this year, as well as perky birds in their nests to hang in your tree for good luck.

BOOKS are always welcome gifts. Gwen Frostic's latest *Wing-Borne* is a happy addition to her four other publications. The selection of books for children is large. Our extensive list of titles includes books on bonsai, flower arranging, gardening, botany and nature. See page 117 for a partial listing of books available at the Gift Shop all year.

DRIED PLANT MATERIAL, extremely popular at last year's sale, will be offered in greater variety to satisfy imaginative arrangers.



TRIM YOUR TREE with old-fashioned wax ornaments, imported owls made of wood shavings, straw angels and stars from Sweden, gaily colored baked bread ornaments, wooden snowflakes intricately carved, and many other unusual trimmings.

Walter Brockmann has designed a charming collection of ceramic ornaments — among them old-time locomotives, gingerbread men and drummer boys.



THE GOURMET CUPBOARD, opened for Christmas, will be crammed with tempting and unusual gifts for the impressario of the kitchen. On its shelves will be a special blend of tea packed in owl jars, attractive tea sets, amusing egg timers, mortars and pestles, colorful salt and pepper shakers, and dried herbs for the adventurous chef.

FOR CHRISTMAS CARDS, holiday invitations and gift enclosure cards see Ravia's collection of unique designs.



FOR GIFTS to please the most discriminating taste, remember the Annual Christmas Sale at the Gift Shop, Boettcher Memorial Conservatory, November 29 and 30.



THE FAMILY GESNERIACEAE

D. L. DENHAM

Most “proper” acquaintances start with an introduction, and so: Readers of *The Green Thumb*, may I introduce you to the family *Gesneriaceae*. Family *Gesneriaceae*, these are the Readers of *The Green Thumb*.

But this formal introduction is colorless and sterile and certainly not befitting such a beautiful and interesting group of plants.

One might try a pedantic introduction and say that the family *Gesneriaceae* is a group of less than 2,000 species of plants of mostly pantropical distribution; that in order to belong to the family the plants must have the petals joined into a tube at least at the base and that the fruits must be composed of but one chamber or locule containing many small seeds; that the most familiar cultivated genera are *Saintpaulia*, *Sinningia*, *Achimenes*, *Streptocarpus*, *Reichsteineria*, *Episcia*, *Columnnea* and *Aeschynanthus* — and so on for a whole volume. But by then only a stalwart student would still be awake.

A historical introduction, although perhaps more readable, is not much better. True, I could take you back to the year 1850, when the frontiers of the European World had expanded so rapidly that its leaders in science, industry, religion and matters of state were hard put upon to assimilate the new ideas and the wealth of material things brought back from the four corners of the globe. And I could point out that in that day it was fashionable for the noble and wealthy to maintain “glass houses” and to display select and wondrous plants there; and that during this period scores of beautiful and unusual gesneriads were sought out, grown, selected and hybridized until there were hundreds of named clones available. And then I would lament how times changed; how the glass house became too expensive to maintain and how the interest in gesneriads waned so that by 1930 the number of available gesneriads in cultivation was but a pitiful reminder of beautiful plants now lost, some of them forever.

But then I would strike a happy note, and say that in the last two decades the advent of central heating, inexpensive small greenhouses (and equally important, more leisure time for the common man) here in the United States made possible the growing of gesneriads successfully at home. And then I would have to marvel at how one genus of *Gesneriaceae* from Africa, the genus *Saintpaulia* (promptly and ineptly dubbed the “African Violet” although it has no

relationship to a violet at all) gained in popularity until some visiting Russian diplomat must have sent back a coded report saying that behind every window, under every fluorescent light, and in every greenhouse in the country there grew an African violet. And then I would be in the present. Today many genera of *Gesneriaceae*, forgotten for generations, again appear in tradesmen's catalogs, and the number of hybrids and selected strains again is legion.

Obviously this method of introduction isn't satisfactory, either; so perhaps you had better try the direct approach, genus by genus. Grow the plants yourself! But a few notes and suggestions may still be in order.

Within a few hundred miles of the recent Olympics in Mexico City you can find (if you know where to look and can ride horseback and pole a raft) in the neighborhood of 50 gesneriad species — some so newly discovered that they have as yet not been described or even named. They will bear strange Greek and Latin names: *Achimenes*, *Alloplectus*, *Columnea*, *Diastema*, *Drymonia*, *Episcia*, *Hypocyrtia*, *Kohleria*, *Niphaea*, *Phinaea*, *Rechsteineria*, *Solenophora*, *Rhynchoglossum*, and *Smithiantha*; but all are gesneriads and all are interesting. Some are truly beautiful, such as are the members of the genus *Smithiantha*.

East of Mexico City on the way to Vera Cruz the high inland plateau of Mexico breaks suddenly and drops swiftly to the coastal plain below. Here moisture-laden winds from the Atlantic seasonally dump torrents of water to scour deep gorges or "Barrancas" in the escarpments; and it is along this mountainous rise, from Vera Cruz into Guatemala that one may find *Smithiantha* species.

I will never forget the first time I saw them there.

It was October, and the summer monsoon was about over. We had made our way inland by road and ferry across the meandering rivers of the tropical lowlands to a point where a logging road — impassable to passenger cars — fought its way up the scarp to some 9,000 feet along the coastal range and then down into the valley of Oaxaca. Here, at about 1,000 feet elevation, we came upon a colony of the white-flowered *Smithiantha multiflora*.

Above us, the steep slope, so densely covered with vegetation that one must use a machette to penetrate it, disappeared in a bank of clouds. Below us, the tropical lowlands stretched away to the sea.

But here the dry season approached, and the *Smithiantha* was past its peak of bloom, its energies now being expended to mature curious underground stems by which it could survive the coming drought. As I carefully dug for the catkin-like scaly rhizomes, I realized that this colony had probably been there for centuries, propagating itself asexually until a chance seed might start another colony in a similar place, perhaps only a few hundred yards away through the dense undergrowth. And I wondered how rare the plant might be, for it has been collected very few times in recorded history — and always in this general vicinity.

There may be as many as six species of *Smithiantha* hidden away in this rough terrain. Some few of them we have recently been instrumental in "bringing back alive." Two of them have yet to bloom. They may be new to science and horticulture or they may be species described a hundred years ago and now represented only by much changed progeny. It is too early to tell. In any case, their characters may someday be combined by hybridization and selection to



Smithiantha multiflora, published as *Achimenes (Naegelia) amabilis* by Decaisne in *Flore des Serres*, Volume 12, Plate 1192, 1857 — more than a hundred years ago.

give a host of plants which will take second place to few in their beauty, and which will supplement those smithianthas currently offered in the trade.

In case you are interested in growing them, you should have little difficulty in obtaining the species *fulgida* and *multiflora* from recent collections and *cinnabarina* and *zebrina* from collections made in Mexico many years ago, as well as a dozen or so fancy named hybrids and clones.

Believe me, these plants with their 1 to 2 inch long tubular-spreading flowers — varying in color from white to brilliant red-orange and held well above the soft, velvety, often red-maroon-haired, heart-shaped leaves in racemose clusters are worth cultivating.

And cultivation is simple. Four or five of the scaly rhizomes can be planted an inch or so deep in a 5 or 6 inch pot of a loose-textured soil. The pot is watered lightly and then kept practically dry until new growth shows (the dry-season condition of their natural habitat). Then water well, being sure that the pots are well drained (the monsoon season). Fertilize occasionally and keep in a strong light where it is a little cool at night but warms up some during the day. As the plants start to die back after blooming reduce the amount of water (beginning of the dry season); then, in a few weeks shake out the rhizomes, which may now have increased their numbers somewhat, and repot for the new year's growth and bloom.

Then there are the other Mexican Genera . . .

But perhaps a discussion of them should await another time.

GRAPE TRIALS; Progress Report for 1968

DR. MORAS L. SHUBERT

As visitors to the Denver Botanic Gardens have observed, we planted 12 varieties of grapes in 1967. It did not seem wise to take space to report on their performance last year, so this constitutes the first report on the performance of the varieties now under trial.

This seems as good an opportunity as I will ever have to say that the reason I requested space for the trial vineyard is that I am convinced that grapes should be in every home garden. It seems to me that there has been too little said in these pages about the vine as a dual-purpose ornament and fruit producer in this region. In the March 1949 issue of *The Green Thumb*, Mr. Robert E. Ewalt was quoted as having recommended certain varieties, but we have been unable to find any other such recommendations in later volumes. I suspect that the apparent lack of interest shown in viticulture in this region is that early trials may have been failures caused by the harsher environment of pioneer conditions. With our radically-modified environment created by irrigation and windbreaks, we have a rather ideal climate for grape growing.

It has been my observation that grapes grown in the Denver area produce well and are particularly free of pests and diseases. This does not mean that they are free from foliage-feeding insects, but I have not seen the fungus diseases that are so common in humid climates. Even when the white fly attacks sometimes in midsummer, it is easily controlled with relatively harmless spray materials.

The greatest hazard I have seen is hail. But what kinds of garden plants do we have that are safe from it?

To give an idea of the performance of our trial varieties to date, you will find what kinds we have and how they have survived through this growing season in the following table.

Data on 1968 Performance of Grapes at Denver Botanic Gardens

<u>DBG No.</u>	<u>Variety Name</u>	<u>Fruit Color</u>	<u>Survival¹</u>
671	Niagara (3 yr.)	White	100%
672	Steuben	Blue	70%
673	Fredonia	Blue	60%
674	Delaware	Red	90%
675	Niagara (2 yr.)	White	100%
676	Concord	Blue	100%
677	Interlaken	Amber	100%
678	Seedless Concord	Blue	90%
679	Thompson Seedless	White	80%
6710	Carmen	Blue	100%
6711	Catawba	Red	80%
6712	Seibel, 13053	Blue	60%

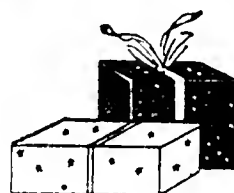
¹Survival through two growing seasons, based upon ten planted for each variety.

It is anticipated that next year we will be able to report on the fruit production of these vines. One 3-year Niagara had two clusters this year, but most of them should bear fruit in 1969. It is also hoped that we will be able to add more varieties to test during the next spring planting season.



ANNUAL CHRISTMAS SALE

DENVER BOTANIC GARDENS GIFT SHOP



Boettcher Memorial Conservatory
FRIDAY, November 29—SATURDAY, November 30
 Hours — 10:00 a.m. to 4:30 p.m.



Books Available in Gift Shop

ABC of Japanese Gardening.....	1.00
All about Miniature Roses.....	Moore 5.95
Artificial Light Gardening.....	Johnson and Carriere 4.50
Cactus and Succulents and How to Grow Them.....	Haselton .75
Cacti of the Southwest.....	Erle 2.25
Colorado Mushrooms.....	Wells and Mitchel 2.00
Creativity in Flower Arranging.....	Bode 5.95
Driftwood Miniatures.....	Schaffer 4.95
Drought Resistant Gardening.....	Nehrling 6.95
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Observers Nature Series for Children.....	2.95 and 3.95
Old Shrub Roses.....	Thomas 6.50
Pictorial Checklist of Colorado Birds.....	Bailey and Neidrach 10.00
Rare Orchids Anyone Can Grow.....	Kramer 6.95
Roadside Wildflowers.....	Dodge 1.50
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Sunset Garden Books.....	1.95 and 2.95
Complete Selection of Brooklyn Botanic Garden Handbooks.....	1.00 and 1.25

Many other books on Japanese Gardens, Bonsai, Ikebana are available.

CHRYSANTHEMUMS

DR. A. C. HILDRETH

Botanists recognize more than 150 *Chrysanthemum* species — mostly of Old World origin. Many gardeners are surprised to learn that such common plants as shasta daisy, feverfew, painted daisy, marguerite and costmary are, botanically speaking, *Chrysanthemums*.

The fact is, "chrysanthemum" is both a botanical and a horticultural name. Botanists use this name for a certain genus of the composite family. This genus, as already indicated, contains many species. Horticulturists use the same name for a certain group of cultivars, all of which belong to the botanists' genus *Chrysanthemum*, but which can be traced back to one, or at

most to only a few, of the botanists' *Chrysanthemum* species. Unfortunately, when used by horticulturists, the name chrysanthemum is often shortened to the inelegant "mum."

Ancestors of the modern chrysanthemums of florists and gardeners had thousands of years of cultivation and selection in east Asian gardens before being introduced to the western world. This diverse ancestral group and its descendants have been given various Latin names, as *Chrysanthemum sinense*, *C. hortorum* and *C. morifolium*, the latter being the presently accepted one. This species then is a cultigen of east Asian (probably Chinese) origin.



Torrington Plots, Early August

Most authorities regard *Chrysanthemum indicum*, native in China and Japan, as the ultimate source of oriental garden chrysanthemums. The possibility that they were of hybrid origin, however, is not entirely ruled out.

The early history of oriental chrysanthemums in Europe is vague. In 1689, six varieties were reported as growing in gardens of Holland. In 1754, the chrysanthemum was brought to England from China. These early introductions made little impression on European horticulture.

In 1789 chrysanthemum plants were imported into Marseilles, France. Plants from this source were widely distributed in England and France. In 1795 a chrysanthemum plant obtained from a Paris nurseryman bloomed in Chelsea — said to be the first chrysanthemum to flower in England.

During the first half of the nineteenth century, interest in chrysanthemums increased rapidly in England and France. Plant collectors of the newly established Royal Horticultural Society (England) introduced new types from China and Bengal. Agents of the East India Company also imported chrysanthemums from China. More types were brought from the Orient to France and French horticulturists began an active chrysanthemum improvement program.

No one knows when or by whom oriental chrysanthemums were first brought to America. It is doubtful if they were grown in colonial gardens, as some writers claim. The best estimate is that chrysanthemums reached America about the end of the eighteenth century. Several kinds were exhibited in 1830 before the Massachusetts Horticultural Society.

The opening of Japan to world trade (1854) released a wealth of chrysanthemum types which Japanese gardeners had been developing for more

than 1400 years. Both Americans and Europeans were quick to exploit this newly found treasure. Choice Japanese types were imported in 1863 by Peter Henderson of Jersey City. Their exhibition in New York and Philadelphia in 1864 sparked interest which boosted American chrysanthemum culture into a position of prominence.

During much of their history in America, chrysanthemums were almost entirely grown in greenhouses and conservatories. In 1904, L. H. Bailey, in his *Cyclopedia of American Horticulture*, estimated that of chrysanthemums then growing in the United States, 90% were for cut flowers or pot plants and only 10% were garden plantings.

Much earlier, however, English and French horticulturists had laid the foundation for outdoor types. In 1846, a plant collector of the Royal Horticultural Society brought to England from Chusan Island, China, two small-flowered very double chrysanthemums. These were the progenitors of all pompon types. French breeders at once began improving these flowers.

Pompons soon reached America where they were first grown in greenhouses. Some proved to be hardy out-of-doors in mild parts of the country. They bloomed very late and their colors were dull, but plants and flowers were tolerant of fall frosts. By the turn of the century, pompons were growing in most eastern and midwestern states.

Still earlier, during the 1830's, French horticulturists discovered two August-blooming chrysanthemums. Seedlings were grown and selections were made. These were the ancestors of most of our modern early-blooming garden types.

During the 1900's, several early-flowering cultivars were imported from France. Although they were not hardy enough for the coldest parts of our

country, they were grown extensively in milder regions. Some were used as parents by breeders of that time, notably, by Elmer D. Smith of Adrian, Michigan, the dean of American chrysanthemum breeders, and also by F. L. Mulford of Washington, D.C.

The 1930's was an important period in garden chrysanthemum history. In 1932, R. N. Kellogg Company, Inc., Three Rivers, Michigan, introduced and vigorously promoted under the trademark of "Azaleamum," floriferous chrysanthemums about 15 inches tall. They bloomed very early and were hardy in all but the severest parts of the United States. Largely through the efforts of that company, cushion chrysanthemums were popularized and widely distributed.

In 1933, Bristol Nurseries, Bristol, Connecticut, released the first of a group of chrysanthemums called "Korean Hybrids," developed by their famous plant breeder, Alex Cumming. These were hybrids between cultivated sorts and the wild species, *Chrysanthemum sibiricum*. This species added vigor, large flowers, bright colors and sheen to outdoor types.

Originally this wild species was called *Chrysanthemum coreanum* but that name is now regarded as a synonym of *C. sibiricum*. Roderick W. Cumming has pointed out, however, that "the popular term of Korean Hybrids was legitimate, since Korea was the source of the species"* which his father had used in developing these hybrids.

In 1937, F. L. Mulford of the U.S. Department of Agriculture, Washington, D.C., introduced 12 chrysanthemum cultivars. These were the end



Medicine Bow



La Ramie



Sacajawea

*From Cumming's *THE CHRYSANTHEMUM BOOK*. Copyright 1964. D. Van Nostrand Company, Inc., Princeton, New Jersey 08540



Belle Fourche



Granger



Platte

product of more than 20 years of selecting open-pollinated seedlings, starting with the earliest cultivars available from English and American sources, and two kinds found in old gardens of western New York.

Other noted chrysanthemum breeders who started their work during the 1930's were Dr. E. J. Kraus, University of Chicago, and Dr. L. E. Longley, University of Minnesota, both of whom were concerned with hardiness and earliness.

Of special interest to gardeners in the High Plains-Rocky Mountain region is the Chrysanthemum Project of the Cheyenne Horticultural Field Station, U.S. Department of Agriculture, started in 1932 by the writer. The objectives were to find or to develop garden chrysanthemums suited to this general region and to other areas having equally severe climates.

At that time there was no known chrysanthemum that could be relied on to survive Wyoming winters nor to bloom in its short growing seasons. Only one Colorado nurseryman was bold enough to offer chrysanthemum plants. His three different kinds were not listed by names but, hopefully, as early bronze, early white and early yellow.

During the early years of the project about 2000 kinds of chrysanthemums were assembled and tested at the Station. These included commercial cultivars, breeders' numbered selections and seedlings grown from seed received from Dr. E. J. Kraus. Of this material only 20 proved to be hardy enough and early enough for Cheyenne, but these were deficient in other characters and in need of further improvement.

The only way a busy Station Superintendent, with no technical assistant, could carry on a chrysanthemum improvement project was to enlist the aid

of Nature. This was done to the fullest extent.

The procedure adopted was to collect seed from open-pollinated plants and grow about 3000 seedlings a year. These were added to the test. Plants that survived the winters were hardy. Any that matured seed were necessarily early-flowering. Wind and fall snows selected the plants for sturdiness. We had to select mainly for flower quality. Insects did the cross-pollination. Promising individuals were increased by cuttings, and plants were sent for further trial to cooperators in severe climates of several northern and western states and some Canadian provinces.

Early in these tests, 70 selections were received from F. L. Mulford. Of the 12, already mentioned, which he released in 1937, only 5 were hardy enough for Cheyenne. Ten others which did not merit national distribution were reasonably well-adapted to our conditions. In the years 1938-1940, all 15 were increased at the Station and distributed to nurserymen in the High Plains-Rocky Mountain region.

From 1941 to 1956, ten hardy, early selections developed at the Station were introduced: Arikara, Dakota, Flicka, Hidatsa, Lt. Backner, Ogallala, Overlay, Roza, Tensleep and Waku. Some of these are still available in the nursery trade.

By an unorthodox method, we had developed super-hardy, super-early chrysanthemums for areas with severe climates where this flower could not be grown before. Of greater importance, we had built up a broad foundation of valuable parental material. In fact, several of our lines were practically pure for hardiness, earliness and plant sturdiness. This material was shared with breeders in other cold regions such as Minnesota, Montana, Nebraska, New Hampshire and some Canadian prov-

inces, so that they could breed types specially adapted to their own areas.

In 1951, Gene S. Howard joined the Station staff. He began a breeding program to improve flower size and quality in early, hardy chrysanthemums by crossing the very hardy, very early strains developed at the Station with high-quality, large-flowered but tenderer types. Hand pollination was used throughout.

By 1964, he had developed and released 22 such hybrids: Aztec, Big Horn, Bridger, Buffalo, Gold Choice, Hoback, Inca, Little Sandy, Maverick, Meeteetse, Mohave, Powder River, Red Chief, Red Desert, Red Warrior, San Saba, Seminoe, Shoshone, Sundance, Togwotee, Wapiti and Wind River. Also released was a yellow sport which he discovered on a plant of the white-flowered Alabaster, and named Alabaster Gold.

From 1960 to 1965, fourteen cultivars were introduced jointly by the U.S. Department of Agriculture and the Montana Agricultural Experiment Station. These plants were developed by Gene S. Howard at the Cheyenne Horticultural Field Station and were selected and distributed by Homer N. Metcalf of the Montana Station. They were named: Bannack, Blackfoot, Clancy, Custer, Elkhorn, High Line, Monida, Mountain Sunset, Ravalli, Red Rock, Silver Run, Sun River, Wibaux and Yogo.

The Chrysanthemum Project at the Cheyenne Horticultural Field Station was officially terminated in 1964. All numbered selections and untested seedlings were transferred to the Wyoming Agricultural Experiment Station for final testing and distribution. Dr. Charles W. McAnelly, Horticulturist at the Wyoming Station, is in charge of this work.

In 1965, nine cultivars selected from

this material were released jointly by the U.S. Department of Agriculture and the Wyoming Agricultural Experiment Station. These were: Belle Fourche, Dubois, Fontenelle, Gros Ventre, La Barge, La Bonte, La Grange, La Ramie and Platte. Scheduled for release next spring are: Chugwater, Crowheart, Granger, Medicine Bow, Moskee, Popo Agie, Sacajawea and South Pass.

Cultivars developed at the Cheyenne Horticultural Field Station during the 32 years of the Chrysanthemum Project are generally called "Cheyenne Chrysanthemums." The group has no visible distinguishing feature. Flowers vary in size, color and form. Plants range from dwarf cushions to a height of 3 feet. Most of them, however, are intermediates — 18 to 24 inches high. Their only similarities are hardiness, earliness and plant sturdiness. They need no staking, pinching nor winter protection.

The Cheyenne group and other sources now provide plenty of chrysanthemums well-adapted to our region. We should remember that we have colder winters than most supposedly cold parts of the East and Midwest. Plants described as hardy in Connecticut, Ohio or Iowa may freeze to death in Colorado. Before buying chrysanthemum plants, make certain that they are hardy under our conditions.

During the last three decades there has been no major breakthrough in garden chrysanthemum development. Certainly nothing has occurred comparable in importance to the discovery of



Crowheart

early-flowering types, the release of Japanese types to the western world, the breeding of Korean hybrids or the introduction of cushion types.

There has been, however, steady improvement in flower size and quality and in adaptation to special environments. This has been brought about by some of the people previously mentioned and also by such breeders as Glenn Viehmeyer, University of Nebraska; E. C. Lehman, Faribault, Minnesota; Orville and Leva Dunham, Niles, Michigan; and the late Dr. Frank L. Skinner, Dropmore, Manitoba, Canada.

What the future has in store for garden chrysanthemums, we can only guess. Certainly approximately 150 *Chrysanthemum* species still largely untried by hybridizers suggest that possibilities for further improvement have not been exhausted.

A DENVER BOTANIC GARDENS MEMBERSHIP
Makes the Ideal Gift

EXOTICS OF COLORADO

ELAEOAGNUS, RUSSIAN OLIVE

DR. HELEN MARSH ZEINER

Elaeagnus angustifolia, Russian olive or oleaster, is an introduced plant which has become a popular ornamental throughout the temperate parts of the United States. It is very well-suited to the dry climate and alkaline soils of Colorado and other plains states.

Russian olive is a small tree, usually attaining a height of about 20 feet and seldom exceeding 30 feet. This makes it useful for the small garden. It can also be considered a tall shrub and is often used as a plant for tall hedges. By trimming, its size can be controlled.

The color of the foliage of Russian olive is one important reason why it is a desirable ornamental. The leaves are silvery gray and make an interesting contrast with other foliage. They are narrow, 2 to 3 inches long, and remind one of willow leaves. In fact, if you had never seen a Russian olive before, and no flowers or fruits were present, your first thought might be that this was some strange kind of willow.

Twigs or small branches are often silvery. They are also sometimes quite spiny. The bark, which is dark and very shreddy, adds interest to the winter garden. Look closely at the tan, wooly winter buds — they, too, are attractive.

The flowers are tiny and very fragrant. They are yellowish with a silvery exterior. They occur in axillary clusters of two or three, and open in late spring.

The fruit, which matures in late summer, looks rather like a small, yellowish olive. However, this tree is not related to the true olive which belongs to the family *Oleaceae*, the olive family. *Elaeagnus* belongs to the family *Elaeagnaceae*, the oleaster family.

Birds feed on the fruits of Russian olive, which have a sweet, mealy flesh. While the general effect of the fruit is that it is yellowish, closer examination will show that it is covered with small silvery scales.

These scales, which are modified epidermal appendages, occur on so many parts of the Russian olive that the word "scruffy" is frequently applied to fruits, leaves and young branches. To appreciate the beauty of these scales, they should be viewed with a microscope — seen individually, they are objects of great beauty.

Russian olive has an informal habit of growth and its irregularly-shaped crown sometimes develops picturesque shapes, making it an interesting tree in the landscape. Because Russian olive has a tendency to be shrubby, it is not a desirable street tree unless the lower branches are pruned off when the tree is young. It can be trained into a small tree of regular shape, but much of its charm is in its irregular growth.

Russian olive was introduced from southern Russia, hence the common name. It occurs naturally from southern Europe to western and central Asia.

The tree is drought resistant, frost resistant, and tolerates alkaline soils. However, it prefers moist rich soil with plenty of sunlight, and will be at its best under those conditions. It is said to be relatively pest free.



Naturally, Russian olive has some faults. It is considered by some to be a messy tree — it drops its leaves, small twigs, and unless the birds get there first, its fruits. It also becomes rather scraggly with age.

In addition to its uses as an ornamental, Russian olive is used as a wind-break tree. It is considered a useful tree for erosion control and is sometimes planted to provide food and shelter for small game and birds. The tree is listed among the browse plants of Colorado because it is palatable to deer and elk. Dry leaves which have fallen may be used as food by cattle, sheep or goats.

Two native shrubs of this area belong to the same family as Russian olive, although they belong to a different genus. These are *Shepherdia argentea*, buffalo-berry, and *Shepherdia canadensis*, Canadian buffalo-berry. The latter is quite common and is familiar to many as a low-growing shrub in evergreen forests, particularly lodgepole pine forests. Both of these plants have a scruffy appearance because of characteristic scales.

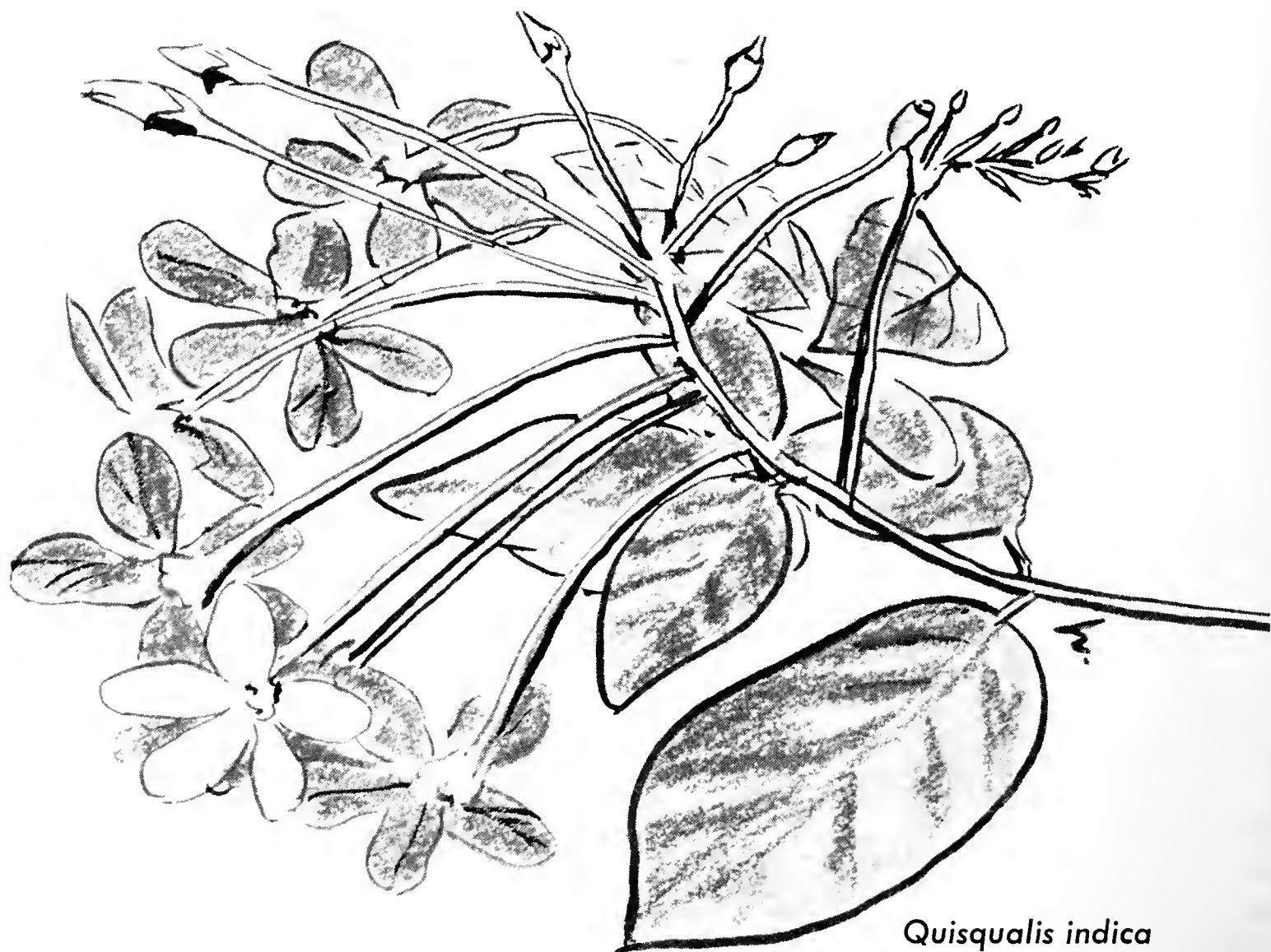
SHOWY VINES

In Boettcher Memorial Conservatory

PEG HAYWARD

No class of plants has so wide a variety of artistic and functional uses as the vine, nature's drapery. The value of flowering or foliage vines is found in their graceful, relaxed, flowing lines used to blend one element with another, soften harsh lines, or cover bare areas. Carefully selected vines can be used to give contrast and character in plantings. Proper utilization of a vine will transform an undesirable post or an uninteresting wall into a desirable landscape feature. Vines are available in an endless variety of size, texture, color and form, adding to their versatility.

It is fascinating to discover the various appendages or means by which vines climb, cling, creep, or dangle. The twiners, vines that climb by twining their stems, require a wire or cord to twine around and each has a definite way in which it will twine. Some vines turn clockwise, others counterclockwise, and the habit cannot be changed. The tendril-bearers climb by wiry appendages which coil around a supporting body. Some vines have weaving stems. The young shoots weave in among the older wood. This is characteristic of the



Quisqualis indica



jasmines. Other vines produce roots along their stems enabling them to cling to walls of all sorts. These are often provided with saucer-like discs which secrete an adhesive resin that firmly attaches them to a surface.

A number of showy vines are well-established in the Boettcher Memorial Conservatory. They add to the tropical effect and provide spots of brilliant color among the other foliage.

Pyrostegia ignea (*P. venusta*), commonly called orange trumpet vine or flamevine, is native to Brazil and belongs to the *Bignoniaceae* family. In late winter and early spring this vine bursts into a vivid flame of color created by large masses of clustered flaming orange-red pendulous flowers. Each flower is a tube about 3 inches long with five lobes which curl back. The flowers seem like small tongues of fire running over the entire vine. The orange trumpet is a quick-growing, high-climbing, evergreen vine. Its three-forked tendrils are tipped with discs that adhere to wood or stone, making it possible to cover anything it can clamber over. The attractive foliage is made up of three pointed, glossy, light green leaflets.

Quisqualis indica, rangoon creeper, is a deciduous, large twining shrubby vine. The name *Quisqualis*, meaning who or what, was given to the plant by a Dutch botanist because of its peculiar habit of growth. A new plant grows at first as an erect shrub, then it sends out a runner from the roots which becomes stouter and stronger than the main stem. This runner, by means of tenacious spines which have developed from the stalks of fallen leaves, climbs to considerable height and becomes a large woody creeper. The fresh green, oblong,

pointed leaves are deeply veined and slightly downy. The flowers are intriguing, drooping spikes of slender green tubes that flare into star-shaped flowers first colored creamy white but changing quickly through shades of pink to red by the end of the day. The flowers have a delicious fragrance of ripe fruit. This Malayan vine is a member of the *Combretaceae* family.

*Hoya carnos*a, wax-plant, a Chinese native, is a member of the same plant family as *Stephanotis* — the *Asclepiadaceae*, milkweed family. *Hoya* is a slow-growing vine that climbs by aerial rootlets. Its leaves are 3 to 4 inches long, smooth, succulent and shining. Each porcelain-like flower is a creamy white star capped with another small star with a pink center. The fragrant, waxy flowers are borne in axillary umbels. They exude sweet nectar drops at night.

The elegance of *Stephanotis floribunda*, Madagascar jasmine, with its startling white flowers against a background of shining dark green foliage combined with the delightful fragrance of the flower have made it a favorite ornamental. This high-climbing, twining vine is commonly planted on walls and grows luxuriantly to a height of 15 feet. The leaves are leathery, up to 4 inches long, abrupt at the apex and slightly heart-shaped at the base. Each blossom is composed of five waxen petals that flare from an ivory colored tube. The flowers are clustered in groups of five to nine. *Stephanotis* is frequently used for bridal bouquets and other floral arrangements where small, white, fragrant flowers are desired.

Tecomaria capensis, cape honeysuckle, also of the *Bignoniaceae* family, is native to South Africa. This is a rapid-growing evergreen with lustrous small-scale dark green ornamental leaves. Cape honeysuckle is suitable as a vine, shrub or ground cover. Its rich orange-scarlet tubular flowers, borne in upright clusters, have five lobes and extended yellow stamens. The nectar is attractive to hummingbirds. In South African folk medicine, the powdered bark is used to relieve high fevers and pain and to induce sleep.

Solandra nitida, golden chalice vine, is a luxuriant, high-climbing vine with lustrous, dark green leaves up to 6 inches long. The cup-like flower is like a golden chalice, 7 to 10 inches long and 6 to 8 inches wide across the mouth. The corolla lobes are reflexed and frilled. The flower is the color of a ripe banana with purplish-brown streaks and has the scent of coconut. This is one of the tropics' most magnificent flowers. The huge waxen buds, when they start to unfold, move so rapidly that the backward curving movement can be easily observed.

Clerodendrum thomsonae, bag flower or bleeding heart vine, is a vigorous, evergreen, twining vine well-suited for growing on trellises and arbors. Prominent veining gives the dark green leaves a crinkled appearance. Quaint little red and white flowers appear in clusters. The crimson "heart" is the true flower and the "bag" is the white calyx. The red flower is composed of a slender tube extending beyond the calyx and spreading into five lobes with fine stamens protruding beyond the flower. The white calyx holds on long after the blooms drop and gradually turns pink, then rose, and finally brown. This free-flowering vine is a West African native of the *Verbenaceae* family.

Ipomoea horsfalliae, Brazilian glory or Prince Kuhio vine, is one of the morning glories, *Convolvulaceae* family, from the West Indies. The vine climbs high and wide, making an excellent cover or screen. The leaves, divided into

five to seven lance-shaped, pointed, wavy-edged leaflets, spread like the open fingers of a hand. They are dark, glossy green on top and light green beneath. Magenta-crimson flowers, each like a long bell with a waxy tube and a five-lobed mouth, hang on the vine in great profusion in autumn, winter and spring in a mass of brilliant color.

Monstera deliciosa, ceriman or Mexican breadfruit, is one of the climbing aroids. In its native habitat it is a woody, glabrous, epiphytic vine with long cord-like aerial roots growing out from the nodes. The leaves have blades that are roundish in outline but slashed at intervals half way toward the center, giving a star-shaped effect. The center of the blade is characterized by large perforations which have given the plant common names like Swiss cheese plant and window-leaf. The inflorescence resembles a white calla lily with a club-like flower spike rising from a creamy-white bract. The ceriman produces massive edible fruits. Its collective fruits are built up of hundreds of small roundish, single fruits pressed firmly one against the other. Fruits should not be eaten until dead ripe because of the needle-like crystals of calcium oxalate which cause pain when swallowing. The fruits have a delicious fragrance, with a delectable flavor between that of pineapple and banana. The plant's adventitious roots are used for making strong baskets and wattle for furniture.

Other colorful vines in the Conservatory are the *Bougainvillea* featured in a separate article in this issue of *The Green Thumb*; and the *Passiflora species*, covered in the November-December 1967 issue. Numerous other showy vines have been used to enhance and dramatize the unique architecture of Boettcher Memorial Conservatory.



Clerodendrum thomsonae



THE CHILDREN'S GARDEN—1968

SALLY COOK

The ninth year of the Children's Garden Program at Denver Botanic Gardens began in April. Beginning gardeners made germinators with paper towels and seeds. Dr. Joseph Hovorka,

former garden supervisor, conducted a class on the use of tools and the proper methods of planting. Advanced gardeners learned about propagation from cuttings; Ernest Bibee, Conservatory Superintendent, instructed.

Actual work on the gardens began May 13 when each of the 125 gardeners was assigned a plot of 100 square feet. The children learned how to prepare a garden for planting, to make the best use of garden space, how and when to harvest, and identification of weeds and insects.

Plants grown this year were: beans (green, yellow and lima), beets, broccoli, cabbage, cauliflower, cucumbers, eggplant, lettuce, carrots, okra, onions, parsley, peppers, radishes, Swiss chard, tomatoes, turnips, giant sunflowers, marigolds, bachelor buttons and asters. Brussels sprouts, grown for the first time, very successful. Squash, pumpkin, geranium, petunia and zinnia were grown in the community garden area.

The garden, open three days a week, was supervised by Miss Sally Cook and several volunteer mothers. Parent supervisors were: Mrs. Lawrence Baker, Jr., Mrs. George Carey, Mrs. Milo Clay, Mrs. Lawrence Danahey, Mrs. John Falkenberg, Mrs. Perry Hendricks, Mrs. Carroll Hoge, Mrs. Josephine Lewis, Mrs. Gus Nelson, Mrs. George Rucker, Mrs. John Vittetoe and Mrs. Norman Yabe.

Weed-outs, educational programs and potluck lunches were important activities of the season. Highlight of the summer program was the Garden Fair and Graduation, held September 7 with Mr. Lawrence Long, former President of Denver Botanic Gardens, as guest speaker. Children showed their crops; their gardens were judged and opened for visitors. Trophies and garden merchandise (donated by Curtice Manufacturing) were awarded for the outstanding gardens. Certificates for successful completion of the course were given to 110 children.

In the beginners group Nancy Falkenberg placed first, Ingrid Ljung second and David Vittetoe third. Honorable mention awards were given to: Franz Gaschler, Lincoln Jackson, Michelle Krawchik, Jerry Saliman and John Vincent.

In the advanced group Peggy Kenney was the first-place winner, Mary Kay Kenney was second, and Kathy Falkenberg placed third. Honorable mention awards were earned by Renne Choury, Helen Danahey, Maxine Garrett, William Garrett, Helen Goldstein, Bob Marranzino, Tom McLagan, Ann Metzger, Steve Roper, Debbie Vittetoe and Patty Ward.

The season ended with a clean-up and harvest day in October.

One of the most important goals of the Children's Garden Project was expressed by a little boy who had won an honorable mention for his garden. While busily pulling weeds the next day he proudly explained to his younger brother, "You know the best thing about winning was that I did this garden all by myself."

THE TIME IS RIPE

KENNETH J. MILLS

A year has passed since the first Denver Public School-Botanic Gardens summer botany class. It is time to evaluate, to weigh the worthiness of the second summer botany class — has it been more meaningful than last year and what planning should be done for the future?

The basic plans for the class formation remained much the same — students from every high school in the Denver Public Schools were eligible to apply. Academically, they must have completed one year of biology satisfactorily, have a good "C" average or better, and each one taking the class must plan to take only that class, as it would conflict with other class activities.

Students spent a minimum of 8 hours between May 18 and June 17 in planning and preparing their garden plots; 35 hours were used for field trips; 65 hours spent in actual classroom and lab activities. Total minimum time by each student who had perfect attendance was 108 hours. Extra time was spent by a number of individual students. The average required time for a summer school six-weeks course is 70 hours of class time. However, as we well know, time, credit, and money are not the real values in education or life — it is what each does with that time that really counts. Does it motivate, does it have meaning, and is it significant for both the present and the future? As educators, we must ask ourselves this now — not later. Time is too precious and the lives of our young people pass through our hands but once.

The aim of the Botany Seminar, which in a broader sense could be called biology field experiences, is not necessarily to make botanists out of these young people, but to give them a greater sense of the value of life, especially in understanding nature so that each may enjoy, love, respect and use these resources wisely.

Field trips to the five plant zones were used to introduce the students to many of the native plants and animals of Colorado. We visited the Plains Conservation Center southeast of Buckley Air Force Base, a large block of prairie land set aside as a natural and original preserve. The ecology of this plains zone was discussed by Dr. E. H. Brunquist, Curator of Botany, Denver Museum of Natural History, and Dr. Wayne G. Christian, Chairman of the Denver Botanic Gardens Education Committee. The students also were able to visit the sod

house built on the Conservation Center grounds. Mr. Gene Herrington told of its role in the lives of early settlers.

The visits to Red Rocks Theatre area, Squaw Mountain and Denver Botanic Gardens' land above Evergreen acquainted the group with plants found in the foothills and montane zones. Everyone worked out together the classification of one plant while in the field, in order to learn how one gets to know a plant — its name and characteristics. Then each classified one or more plants on his own for actual experience.

The alpine and subalpine plants were introduced to the students when they were on the M. Walter Pesman Trail located on Mt. Goliath above Echo Lake.

The students spent a day at Colorado State University where Mr. Richard G. Walter and his botany students explained the meaning of an herbarium, demonstrated the procedures of collecting and mounting plant specimens, and explained plant research in the greenhouses. In the afternoon each student worked in the laboratory with a college student keying out specific plants to the family, genus, and species.

Often the group went into overtime as when Mr. Ernest Bibee showed and discussed tropical plants. The main complaint of the students in this course was, "We didn't have enough time to see and do the things we wanted to learn about." It was not unusual for a student to remain until nearly noon — working on air-layering, cuttings, transplants or discussing problems about his garden plot, home planter, or written and oral reports.

On the final day of class, Mrs. Helen Stanley demonstrated the making of a miniature garden and had each make one of his own.

The use of the microscope and stereo-microscope in study of specimens obtained in the field added to the understanding of morphology, physiology, and adaptation to environment.

The purpose for going much deeper into the actual "doing" by these young people in this article is to give the reader a clearer picture of actual day-to-day work. Thus, the reader can better evaluate such a summer experience for our youth and make suggestions and recommendations for future groups.





I want to thank the Denver Public School Administration, Dr. L. B. Martin, Director of Denver Botanic Gardens, and his fine staff for their help in making this course really “go.” We have the natural resources at our fingertips and we have the student desire for enrichment. All we need for the future is more action — *now* — the time is ripe.

A Chinese Oak

S. R. DEBOER

Some 40 years ago Uncle Sam sent botanists to various parts of the world to collect plants. A favorite spot for unknown plants was China. Small seedlings from there were distributed to plant lovers everywhere. Thus I received two very small plants of an oak variety. One of these died in transplanting. The other one grew and today is over 30 feet in height. It was labeled *Quercus sp.* indicating it was not known beyond being an oak tree. Later it was labeled as a variety of the white oak. At this time (mid-October) the foliage is an orange-yellow and very beautiful. In the sunlight it makes a bright spot among the other trees. A few years ago the leaves turned a velvety red, but in later years they are yellow. The tree is very hardy though it has developed a couple dead branches. The trunk is straight to the very top. The tree requires little care.

Denver
Botanic Gardens
LECTURE SERIES
1968-1969

1968

October 17

DR. H. D. HARRINGTON, Professor Emeritus of Botany, Colorado State University: "**Edible Native Plants of the Rocky Mountains.**"

November 14

F. L. S. O'ROURKE, Associate Professor of Horticulture, Colorado State University: "**Trees for Tomorrow.**"

1969

February 27

DR. LOUIS B. MARTIN, Director, Denver Botanic Gardens: "**Denver Botanic Gardens Master Plan.**"

March 27

DR. JAMES R. FEUCHT, Extension Area Horticulturist, Colorado State University: "**Common Poisonous Plants in and around the Home.**"

April 24

MRS. RUTH ASHTON NELSON, Writer, Teacher of Plant Identification and Informal Botany: "**Greek Wild Flowers.**"

May 22

KENNETH HORN, Supervisor, Secondary Science, Denver Public Schools: "**Outdoor Education Potential for the Denver Public Schools.**"

These lectures will be presented in the Boettcher Memorial Conservatory, 1005 York Street, at 8:00 p.m. Single lecture tickets are \$1.00; season tickets for the six lectures are \$5.00 and may be procured at Botanic Gardens House, 909 York Street.

A NATURAL 'BONSAI' MAPLE

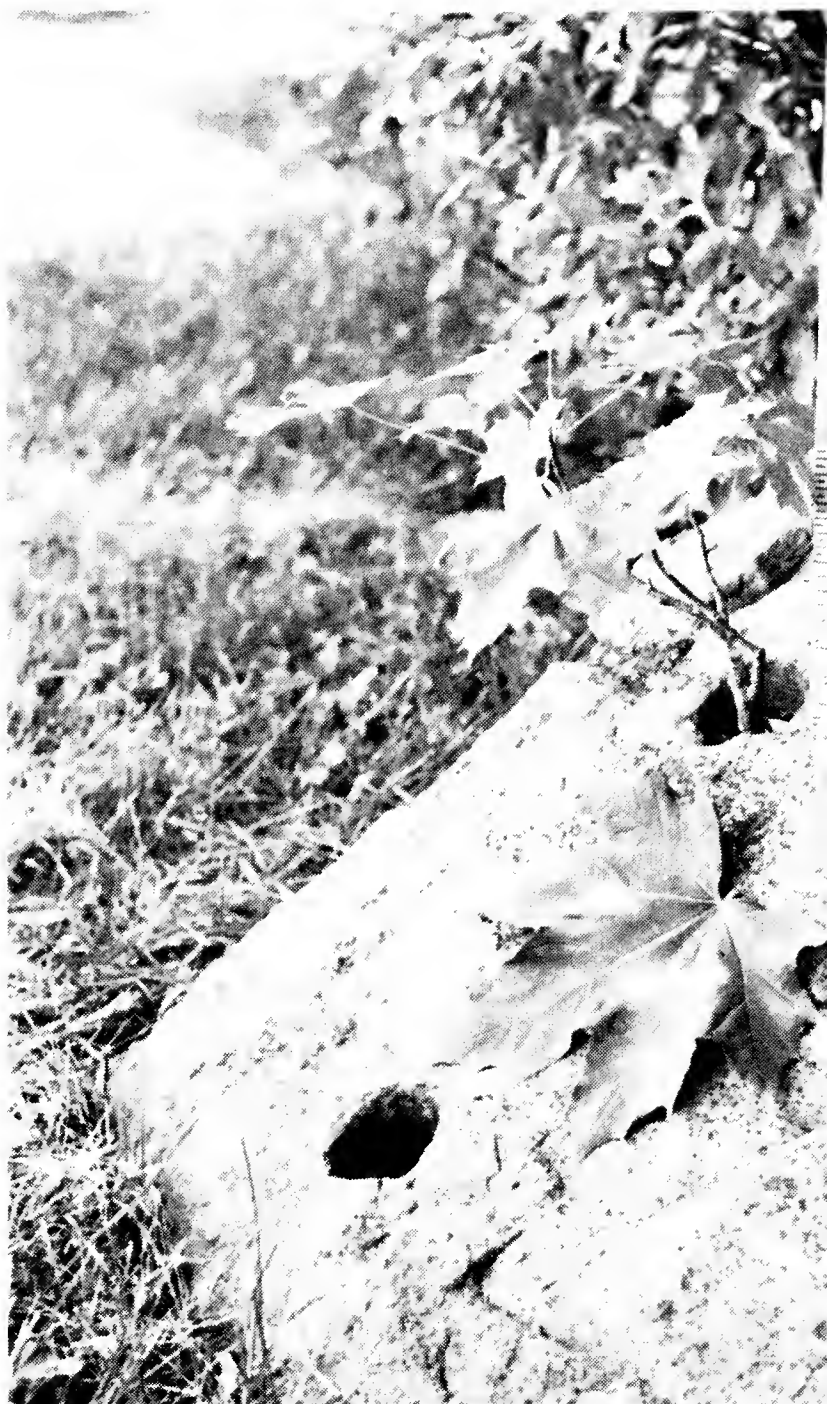
DR. E. R. KALMBACH

The city of Boulder, Colorado, was well-named. This is true particularly with respect to that part of the town adjacent to the "flatirons" from which, during geologic time, rock debris from the higher slopes was torn loose and deposited at lower levels. As a result the channels of glacial drift are littered with boulders of varied size. The largest are close to the hills; farther down one finds those of smaller size; and still farther away are extensive deposits of gravel and sand. At the upper levels immovable boulders still remain and prospective residents have had to build around them, and, in the intermediate zone, some were blasted to removable size. The home in which the Kalmbachs lived was in the latter area.

One relic of the early construction process in the early 1940's is a half-buried boulder containing two "blank" blaster's holes, each about $1\frac{1}{2}$ inches in diameter and of uncertain depth. Into one of these, wind-borne debris carried with it a seed of a nearby maple. This sprouted and at the time when the Kalmbachs occupied the property in 1955, a seedling maple was observed emerging from one of the blast holes. Little attention was given to it at the time and its exact age was not known. Since then, however, this natural "bonsai" has appeared each year, produced about a dozen thrifty but half-sized leaves and, annually, grew to a height of 6 to 7 inches above the entrance to the blast hole. The diameter of its stem is now $\frac{3}{8}$ of an inch.

Though the age of this miniature is not known, it has been under observation, annually, for thirteen years, during which its overall size and shape has changed very little. It has never received any special care and its sources of nourishment and moisture are merely that which happen to drop into the blast hole. The fact that the plant (tree) remains the same in size, year by year, leads to the belief that its roots have not penetrated beyond the base of the blast hole.

The appended picture, taken this year, also shows a normal-sized leaf from a nearby maple.



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